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MUSEUMS ASSOCIATION.

MANCHESTER MEETING,

1892.

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CORRIGENDA IN MR. F. A. BATHER'S PAPER, "THE FOSSIL CRINOIDEA IN THE BRITISH MUSEUM."

PUBLISHED IN THE MUSEUMS ASSOCIATION REPORT, 1891.

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p. 89, Tablet 9, *for* "GIGAAS" *read* "GIGAS."

p. 91, Tablet 20, *for* "(IBr)." *read* "(IBr)."

p. 92, Tablet 21, *for* "IBr., IIBr." etc., *read* "IBr., IIBr., IIIBr., IVBr."

p. 92, Tablet 23, *for* "IIIBr. IIIIBR. *read* "*i*IIBr., *i*IIIBr."

„ „ „ *for* "INTERTERTIBRACAS" *read* "INTERTERTIBRACHS."

p. 95, Tablet 30, *for* "Primaxit" *read* "Primaxil."

p. 104, label 1, *for* "R'" *read* "R'."

„ label 5, *for* "Arm" *read* "Arms."

p. 105, label 2, *should read* "CYATHOCRINUS, Miller."

p. 105, Tablet 1, *for* "1 B" *read* "IB."

p. 105, Tablet 3, *should read* "(b) from above, showing covering-plates."

p. 107, Tablet 9, *for* "Pl. xiii., x. 1" *read* "Pl. xiii., f. 1."

„ Tablet 10, *for* Pl. x. 2" *read* "Pl. xiii., f. 2."

„ line 8 from bottom, *for* "succeeded." *read* "succeeding"

„ line 7 from bottom, *for* "inserting" *read* "inserted."

p. 108, last line of label *should read*—

"—— will be found in the Gilbertson Collection, Gallery XI., Table-case 15."

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MUSEUMS ASSOCIATION.

REPORT OF PROCEEDINGS

WITH THE PAPERS READ AT THE

THIRD ANNUAL GENERAL MEETING

HELD IN MANCHESTER, JULY 5, 6 & 7, 1892.

EDITED BY

E. HOWARTH, F.R.A.S. & H. M. PLATNAUER, B.Sc.

PUBLISHED BY THE ASSOCIATION,

1892.

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LIST OF MUSEUMS AND ASSOCIATES

Belonging to the Association, with the Names of the Representatives at the Manchester Meeting.

Barnard Castle	
Bolton	
Bootle	*Mayor of Bootle, Councillor Lyon, J. J. Ogle*
Blackburn	*R Ashton, W. A. Abram*
Bradford	*Butler Wood*
Brighton	
Cardiff	*J. Storrie*
Chester	*R. Newstead*
Colombo	
Dundee	
Glasgow	*Coun. Steele, J Paton*
Hereford	*J. Cockcroft*
Hull	
Liverpool	*Rev. H. H. Higgins, R. Paden*
Maidstone	
Manchester (Owens College) ..	*Prof. W. Boyd Dawkins. W. E. Hoyle, J. R. Hardy*
,, (Ancoats) ..	*T. C. Horsfall*
,, (Academy of Fine Arts)	*R. Barber*
Manchester (Academy of Fine Arts)..	*D. A. Little*
,, ,, ...	*J. E. Phythian*
,, (Queens Park)	*C. Virgo*
Newcastle	
Northampton	
Nottingham	*J. W. Carr*
Otago	
Saffron Walden	*J. Clarke, G. N. Maynard*
Salford	
Scarborough	
Sheffield (Weston Park)	*E. Howarth*
,, (Ruskin)	*Ald. W. H. Brittain*
Southampton	
Stockport	*Councillor Fairbrother, Lieut.-Col. Turner, J. Tym*
Sunderland	
Warrington	*J. F. Dutton, C. Madeley W. W. Midgley.*
Worcester	
York	*H. M. Platnauer*

ASSOCIATES.

(Those in italics were present at the Meeting.)

R. Assheton	Manchester
F. A. Bather	British Museum
Caroline Birley	Manchester
Montague Browne ..	Leicester
Mrs. Carr	Nottingham
J. W. Croston	Prestwich
Edward Donner	Manchester
Mrs. E. Donner	,,
F. J. Faraday	,,
Prof. Sir W. H. Flower.	British Museum
L. Greening	Warrington
N. Howard Goulty ..	Romiley
Thomas Greenwood..	London
T. McKenny Hughes..	Cambridge
C. H. Hurst	Manchester
Prof. A. M. Marshall	,,
J. Maxwell	,,
J. Cosmo Melvill	Prestwich
Prof. L. C. Miall	Leeds
A. B. Meyer, M.D...	Dresden
F. W. Monks	Warrington
Miss Emma Phipson	
F. W. Rudler	London
R T Scharff	Dublin
Mark Stirrup	Bowden
Prof. F. E. Weiss ..	Manchester
A. Smith Woodward	British Museum
G. C. Yates	Swinton

Delegates from Library Association —*F. Pacy, J. J. Ogle, C. Madeley.*

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THE meeting of the Association in Manchester was, this year, held at the time when the country was in the midst of a general election; and although Museums are, happily, outside and apart from the general turmoil of politics, many delegates from Museum Committees were kept away from the meeting by political engagements, and the attendance was consequently smaller than would otherwise have been the case.

Notwithstanding this, the meeting was very successful and pleasant, and the arrangements made by the Local Committee were all that could be desired; the warm and hospitable reception given to the Association by the authorities of Owens College, and by the people of Manchester generally, was cordially appreciated by the members.

The papers read at the meeting were of a high order, and the discussions animated and instructive. A new and interesting feature was introduced into the debates by the attendance of delegates of the Library Association, who came to the meeting to discuss the subject of Library and Museum Legislation, with a view to its improvement.

One important object of the Association is to give members an opportunity of seeing one or more first-class and well-appointed museums every year. In no place could this object be better effected than in Manchester. The Owens College Museum, the Ancoats Museum, and the Queen's Park Museum, all afforded points of great interest, appealing to all curators, whether attached to Science or Art.

This meeting is also marked by the introduction of papers on Art Museums; and it should be clearly understood that the Association is in no sense limited to Science Museums, but embraces Art Museums equally.

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The selection of London as the meeting-place for next year will, it is hoped, secure a large attendance. No more generally convenient place could be found, and it is to be hoped that some of our members who have hitherto been unable to attend the annual meetings may find their way thither.

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MINUTES

OF

THE MEETING HELD JULY 7TH, 1892.

The minutes of the last meeting were duly confirmed.

Mr. HOWARTH proposed "That a Committee, consisting of the President, Mr. Madeley, Mr. Paton, Lieut.-Col. Turner, Mr. Howarth, and Mr. Platnauer, be appointed to confer with the Library Association for the purpose of taking steps to improve Library and Museum Legislation, if thought desirable."

Mr. PLATNAUER seconded this motion, which was carried unanimously.

The PRESIDENT then submitted to the meeting the list of officers proposed by the outgoing Council. The list was put *en bloc*, and carried.

The PRESIDENT then announced that the Association would meet next year in London, and proposed that on that occasion a longer period should be devoted to business than had been the case in previous years, it having been found difficult to get through all the work in the time allotted. This proposal was received with acclamation.

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Officers and Council.

PRESIDENT:

PROFESSOR W. BOYD DAWKINS, M.A., F.R.S.

PRESIDENT-ELECT:

PROFESSOR W. H. FLOWER, K.C.B., F.R.S.

VICE-PRESIDENT:

J. WILLIS CLARK, M.A.

HONORARY TREASURER:

ALDERMAN W. H. BRITTAIN, J.P.

COUNCIL:

THE REV. H. H. HIGGINS, M.A.,
S. W. NORTH, F.G.S., } *Past Presidents.*

J. W. CARR, M.A., F.G.S.
W. G. HOYLE, M.A.
F. JAMES.
J. PATON, F.L.S.
LIEUT.-COL. H. TURNER, J.P.
BUTLER WOOD.

A. SMITH WOODWARD F.G.S.

HON. SECRETARIES:

H. M. PLATNAUER, B.Sc.
MUSEUM, YORK.

E. HOWARTH, F.R.A.S.
MUSEUM, SHEFFIELD.

LOCAL COMMITTEE:

PROFESSOR W. BOYD DAWKINS, M.A., F.R.S.
PRINCIPAL A. W. WARD, LL.D., LITT.D.
EDWARD DONNER.
J. COSMO MELVILL, M.A., F.L.S.
PROFESSOR A. H. YOUNG, M.B.
PROFESSOR A. MILNES MARSHALL, F.R.S.
PROFESSOR F. E. WEISS.
DR. C. A. BURGHARDT, F.C.S.

Local Secretary:

W. E. HOYLE, M.A., THE OWENS COLLEGE, MANCHESTER.

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PROGRAMME OF ARRANGEMENTS.

TUESDAY, JULY 5TH.

2 p.m.	Reception Room open.
3 p.m.	Council Meeting.
8 p m.	Opening Meeting in the Natural History Lecture Room, at which the retiring President, J. W. CLARK, M.A., will resign the chair to W. BOYD DAWKINS, M.A., F.R.S., who will deliver his Presidential Address.

WEDNESDAY, JULY 6TH.

9.30 a.m. to 1 p.m.	Reading and Discussion of Papers.
2.30 p.m. to 5.30 p.m.	Mr. J. COSMO MELVILL, Kersal Cottage, Prestwich, invites the members to view his extensive collections of Foreign Shells, British and Foreign Lepidoptera and Coleoptera, and Botanical Specimens.
2 p.m.	Conversazione in the Museum Buildings, by invitation of the PRESIDENT, THE PRINCIPAL OF THE OWENS COLLEGE, AND THE CHAIRMAN OF THE MUSEUM COMMITTEE.

THURSDAY, JULY 7TH.

9 30 a.m. to 12 noon.	Reading and Discussion of Papers
12 noon to 1 p.m.	General Business Meeting and Election of Officers.
2 p.m. to 6 p.m.	Inspection of the Manchester Museum. [During this afternoon an Excursion to the Manchester Ship Canal will be arranged.]
5 p.m. to 6.30 p.m.	Reception of the Delegates by the Mayor and Mayoress in the Town Hall.
8 p.m.	Soirée at the Manchester Art Museum, Ancoats Hall.

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MUSEUMS ASSOCIATION RULES.

ADOPTED AT THE LIVERPOOL MEETING.

1.—That this Association be called the "MUSEUMS ASSOCIATION," and shall consist of representatives of the Museums situated in the United Kingdom, and of other persons engaged in scientific work or interested in Museums, who may be admitted as Associates.

2.—The object of the Association shall be the promotion of better and more systematic working of Museums throughout the Kingdom. In order to promote a better knowledge of Museums, the Association shall meet in a different town each succeeding year.

3.—That each Museum contributing not less than one guinea a year be a Member of the Association, and that individuals interested in scientific work be admitted as Associates on payment of 10s. 6d. annually.

4.—That each Museum be represented by three delegates, each having one vote. Each Associate to have one vote.

5 —That each Museum belonging to the Association and each Associate receive one copy of the publications of the Association.

6.—That the affairs of the Association be managed by a Council consisting of a President, two Vice-Presidents, two Secretaries, a Treasurer, and eight ordinary Members. Three to constitute a quorum. All past Presidents to be *ex-officio* Members of Council. The President, Vice-Presidents and two ordinary Members of Council to retire each year, and to be ineligible for re-election for one year.

7.—The Council to be elected at the Annual General Meeting, and to hold office for one year. The Council shall have power to fill any vacancies that may occur in its ranks between Annual Meetings.

8 —That a General Meeting of the Association be held annually, for the transaction of business, the reading of papers, and the discussion of matters relating to Museums.

9.—The place and time of the Annual Meeting to be determined by the Committee.

10.—All new rules, and all resolutions affecting existing ones, to be submitted to the Annual General Meeting. One calendar month's notice to be given of all resolutions affecting the rules.

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GENERAL PROCEEDINGS.

In the absence of Mr. J. Willis Clark, the retiring President, the chair was taken by Dr. Ward, who gave a brief sketch of the origin and rise of the Owens College Museum. The nucleus of the museum consisted of a miscellaneous collection of objects of Natural History, entrusted to the College authorities by the Town Council. These collections had been largely increased, and had been arranged with a definite view of supplementing the teaching in Natural Science given in the College. Dr. Ward then called upon Professor W. Boyd Dawkins to deliver his Presidential Address.

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ADDRESS

BY

PROFESSOR BOYD DAWKINS, M.A., F.R.S.,

PRESIDENT OF THE MUSEUMS ASSOCIATION,

ON

THE MUSEUM QUESTION.

GENTLEMEN OF THE MUSEUMS ASSOCIATION,—In taking the chair which was so ably filled by my predecessor at Cambridge, I must, first of all, give you a hearty welcome on the part of the Committee of the Manchester Museum. There is, to my mind, a singular fitness in the selection of Manchester as a place of meeting after Cambridge. At Cambridge you had the opportunity of studying the various museums which have, in the course of time, naturally grown out of the development of that ancient seat of learning. In Manchester you will see the collections which have been gathered round Owens College, which represents the newest University development in this country. The genius of the place has left its mark in both. In Cambridge the collections are, as they should be in a region of academic calm, free from trade-winds, arranged mainly, if not entirely, with an eye to University students, and not for the general purposes of a miscellaneous public. In this busy centre of movement and commerce, you will find that the principle of arrangement is twofold. It first aims at meeting the needs of the University students, and of the Mechanics' Institutes, and schools, and other educational bodies, which

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are daily being drawn closer to Owens College, and next, at the instruction and enjoyment of the general public. Our collections, too, are for the most part older than the College, and have been absorbed from without into our educational centre.

The problem which we have attempted to solve is this: How to arrange and organize collections which are, in part, as old as the second quarter of this century, so that they may become valuable in the new learning, and, at the same time, put an outline of the history of nature within reach of the people. This problem, as we all know, is not an easy one. It has, however, to be faced in most of the museums of this country. Whether it has been solved or not, in Manchester, it is not for me to say. Prof. Huxley, in addressing us some years ago on the question of technical education, said that he did not know exactly what shape it should take, but that Manchester was a good place in which to make an experiment for the good of the commonweal. *Fiat experimentum in corpore Mancunensi.* The result of our experiment in museum organization is here, and speaks for itself.

Before, however, I deal with this special attempt to meet the needs of Manchester, I must touch on the general question of museums.

THE MUSEUM IDEA, AND ITS PLACE IN CULTURE.

A museum was, to the Greeks, a place haunted by the Muses, and, in a secondary sense, a building in which liberal studies were carried on, such as that at Alexandria, which was a great University, endowed by the State, divided into colleges, and frequented by men of science and letters. This museum included picture galleries and statuary, and it is not at all improbable that it contained also collections of Natural History. Aristotle, it must be noted, made vast collections, which he used in his history of animals, by the aid of his friend Alexander the Great, and it is hard to believe that the impulse

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which he gave to the study of natural history should not have been felt in Alexandria, where his memory was venerated. With the destruction of this museum, in the days of Aurelian, in the last quarter of the third century after Christ, the name, as applied to a public institution, gradually dropped out of use, and was only revived with the revival of learning in the West, in the times of the Renascence. We owe the first idea of a great national museum of science and art to the "New Atlantis" of Lord Bacon, and the first scientific museum in this country to Elias Ashmole, who founded the museum which bears his name, in 1667, at Oxford. It consisted mainly of the Natural History collections made by the Tradescants, and miscellaneous objects of antiquarian interest, which, in the course of time, swamped the Natural History. Now, under the care of Mr. Arthur Evans, re-organized and re-arranged, it is taking its place among the educational institutions of the University. It was not until 82 years after the foundation of the Ashmolean, that museums were recognized by the Government of this country in the establishment of the British Museum, in 1749, by Act of Parliament.

The modern museum is the outcome of the Renascence, and must keep pace with those great accessions to our knowledge of the history of Nature and of Man which distinguish the new learning of to-day from the old. If it cease to grow, it is dead, and should be removed. There is no finality in museum work any more than there is finality in the acquisition of knowledge.

The Muses should not be forgotten in museum arrangements; and form, beauty, and symmetry should be studied, as well as the outlines of a rigid classification. As an illustration of this, I would refer to the groups of birds in the Natural History Museum at South Kensington, or to some of those in the museum at Newcastle. "A thing of beauty is a joy for ever." There is no reason why things beautiful in themselves should be treated so as to repel rather than attract. The

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element of fit association, too, is one of the important principles. In the case of the temporary exhibition of pictures in the Academy, the fit association of subjects cannot be studied; but there is no reason why, in an Art Gallery, the Muses should be scared by a Venus being placed close to local worthies, or a Madonna close to a party of Bacchanals.

In museums, as in armies, the results are largely dependent on the leaders, who leave the impress of their personal character on their commands. The impulse to the new learning given by Ashmole, Hunter, Flower, and by Franks and Newton, in this country—by Leidy, Dana, Marsh, and Agassiz, father and son, in the United States, will last as long as the museums which they founded and organized. In Paris, the name of Cuvier is inseparably bound up with the Museum of Natural History in the Jardin des Plantes. In Berlin, the Ethnological Museum, and the anatomical collection at the Charité, will keep fresh the memory of Bastian and Virchow in a far distant future, when the names of the great political leaders of these times are fading away. It is, therefore, of primary importance to choose good leaders for museum work, and to offer those inducements which will command the services of the best men.

THE OLD LOCAL MUSEUMS IN BRITAIN.

When I first began to study the question, some thirty years ago, most of the local collections in this country were in a deplorable state. They consisted largely of miscellaneous objects, huddled together with more or less care, and more or less—generally less—named. In one you saw a large plaster cast of a heathen divinity, surrounded by stuffed crocodiles, fossils, and models of Chinese junks, which looked like the offerings of devout worshippers. In another I remember a small glass case, containing a fragment of human skull, labelled "human skull," and a piece of oatcake, labelled "oatcake," while underneath was a general label with the inscription, "A piece of human skull, very much like a piece of oatcake." In

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a third wax models were exhibited, of a pound weight, of veal, pork, and mutton chops, codfish, turnips, parsnips, carrots, and potatoes, which must have cost the values of their originals fifty times over. They had labels explaining how much flesh and fat they would make—theoretically—for we, who are either lean or fat, know that the personal equation has to do with the actual results. They were as carefully modelled as the most delicate preparations of human anatomy. I quote them merely as illustrations of the misapplication of time, money, and museum space.

In many collections Art was not separated from Natural History, nor from Ethnology, and the eye took in at a glance the picture of a local worthy, a big fossil, a few cups and saucers, a piece of cloth from the South Seas, a model of a machine, and, probably, also a mummy. These objects would be all very well in their places, but, being matter in the wrong place, they were covered by the Palmerstonian definition of "rubbish." Such collections as these neither please nor instruct. They have no more right to the name of a museum than a mob has to be called an army. Most of us, I think, are acquainted with this type of collection, which is rapidly becoming extinct with the spread of knowledge. I merely quote them as examples of a state of things from which we have fortunately escaped.

THE PLACE OF MUSEUMS IN THE NEW LEARNING.

The rapid increase of knowledge makes it more and more necessary for museums to be organized, so as to be in harmony with the swiftly changing conditions. The study of things, as well as books, is daily growing in importance. The historian, for example, formerly content with written records, now counts the results of archæological discovery among the most valuable and trustworthy of his materials in dealing with the history of the past. The story of Ancient Greece is incomplete if the explorations at Mykenæ and Ilios, in Athens, in the Greek Islands, and in the Egyptian cities and tombs, be left out of

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account. To the historian the collections of Schliemann, Flinders Petrie, and others are most precious. Nor are they less precious to him who studies Art, or to the ethnologist who studies civilization, or to the naturalist who is interested in the distribution of the various types of mankind, or to the technologist who looks to the evolution of handicrafts. The public mind is beginning to realize the value of well-organized museums for purposes of special research, as well as of general culture. Museums appeal to the interest of the many, while books, and a taste for books, interest a narrower circle. To contemplate, in the British Museum, the frieze of the Pantheon, is of itself an education in Greek Art and in Greek ideas of beauty, and the most unlettered visitor to the Natural History Galleries cannot fail to carry away new ideas about the realm of Nature. It is obvious, therefore, that in museums we have an instrument of great educational value, if they be organized to meet the increasing demands of modern investigation.

THE CLASSIFICATION OF THE MUSEUMS OF TO-DAY.

The museums of to-day fall naturally into four groups. (1) The Art Museum, which includes also antiquities arranged from the Art point of view. (2) The Natural History, which illustrates the history of Nature in its widest sense, and of Man in his physical aspects. (3) The Archælogical and Ethnological, which deals with the works of Man, and his progress in civilization. (4) The Technical, in which objects are arranged in relation to industry. The leading idea of the first is Art; of the second, Nature; of the third, civilization; and of the last, the conquest of mind over matter.

THE PRINCIPLES OF MUSEUM ORGANIZATION.

These four groups are sharply defined from each other. In practice, however, it is often necessary to use for the illustration of one what, strictly speaking, belongs to the others. In all such cases, however, the reason of the presence of the

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alien object must be made obvious, if the general effect of the arrangement is to be preserved. For example, in the Manchester Museum I found it necessary in dealing with the history of the Tertiary Period to illustrate the first appearance of Man, and to carry on the narrative through the prehistoric and historic divisions down to modern times, by a small selected series of specimens showing the progress of mankind. Were it not for this they would be wholly out of place in a collection of Natural History. In like manner, an Egyptian mummy has its due place in the National Gallery in Trafalgar Square, its *locus standi* consisting in the fact that it illustrates the art of portrait painting among the Alexandrine Greeks of the first century after Christ.

Next in the point of importance to the leading ideas in museum work, comes the question of labelling and illustration. The labels should be clear and distinct, and, if possible, in English as well as in Latin. The specimens should illustrate the labels quite as much as the labels the specimens. All possible means of illustration should be employed—maps, diagrams, restorations, and the like—so that the main points and relations are clearly brought home to the visitor. In addition to the systematic catalogue of each specimen, there should also be a popular guide, similar to those of the British Museum. It goes without saying, that a collection of books is also necessary.

The kind of museum most desirable in any place depends entirely on the local conditions, and there is no hard and fast scheme applicable to all cases. Nor is the question of great or small to be looked at otherwise than as one of detail. A small well-arranged collection in a school or in a village will do the work which it is intended to do as well as large museums in the Metropolis, or in a University, or in a centre of commerce. The principles of success are the same in all: they must be orderly, they must be intelligible; they must, as far as possible, appeal to the sense of beauty. Under no circumstances must

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unnamed and unknown specimens be allowed to appear. A ragged recruit may be drilled into a good soldier, but he spoils the parade if he appears out of uniform in the ranks. Nearly all of us who have had to do with museums have sinned in this matter, and it is not for me to cast a stone at my fellow-sinners.

The work, however, is only partially done when a museum is properly arranged, labelled, and catalogued on the above lines. To make it intelligible in the best possible way, it is necessary that there should be lectures and demonstrations given in the museum itself, in which some special points should be taken up which interest either the general public or the special worker. In my experience, oral instruction, with the things before the eyes, in the museum, and not away from it in the lecture-room, is the best manner of doing this. As an example of this, I would refer to the demonstrations organized in the British Museum, by Prof. Stuart Poole, in which ancient Art and civilization were dealt with, and to those which have, from time to time, been given in the national collection of Natural History, under the auspices of Dr. Flower. In this relation the British Museum will be found to be one of the most valuable instruments for spreading knowledge in the University which London will have in the future. In this relation, too, the Geological Museum in Jermyn Street, around which were centred some of the ablest men of the time—De la Beche, Murchison, Ramsay, Edward Forbes, Tyndall, Huxley, and many others—has done most valuable service. It is in this direction that museums will influence the general education in this country, and take their natural place in the new learning.

APPLICATION OF THESE PRINCIPLES TO THE MANCHESTER MUSEUM.

I pass now to the application of the above principles to the Manchester Museum, Owens College. Our experience gained in bringing the old collection into harmony with modern

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requirements cannot fail to interest those who are now engaged in like work, because it may show not only what is to be copied, but what is to be avoided.

When the task of organization was entrusted to me in 1869, there was a large general collection of Natural History, and a large Geological collection. The former had been a first-class collection in the second quarter of this century, but had ceased to grow, and therefore had become dead. The second was in good order, and, under the care of its founders, Binney, Ormerod, and others, was properly named. Both, however, were in a most deplorable state, so far as relates to fittings, and were simply ignored by the general public, and scarcely used by students. The first step was to sweep out of the way the miscellaneous objects which had no place in a Natural History Museum. The next was to organize what remained into a systematic collection in rooms and cases which were unfit for the purpose. Then followed evening lectures and demonstrations in the old Museum building in Peter Street. Later the teaching collections in Owens College were added, and the Museum began to revive and grow slowly, but steadily, as the connection with the college grew closer, till, in 1874, it was transferred to temporary quarters in the attics and basement of the Owens College. It continued to grow in spite of the removal and of the inadequate cases, and the interest of the public was maintained very largely by the system of Saturday afternoon demonstrations in the only part open to the public—the Geological Museum.

The systematic re-arrangement in view of the new buildings was taken in hand. The minerals were arranged, labelled, and catalogued, Dana's "Hand-book of Mineralogy" offering a ready-made catalogue. To meet the mining interests of Manchester special groups of the minerals found in association were organized to illustrate the minerals of Derbyshire, the Lake District, Cheshire, the diamond mines, the apatite mines, and the like.

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For the special ends of the geological teaching, the rock specimens were also arranged, and special groups were formed to illustrate their association—such as the products of Vesuvius, and of the volcanoes of Auvergne—and to illustrate the destruction of rocks by natural causes. Then naturally followed the classification of the fossils, to show the sequence of events in the geological record. In this the Carboniferous flora and fauna naturally took a prominent place, because of the vast importance of the coal-fields to this district. The arrival, too, of the existing higher Mammalia, including Man, on the earth, took a prominent place in the Tertiary collections, and formed the leading idea in the Tertiary chapter of a history of the earth, while the story of the earth was fitly closed by a series of groups illustrating the evolution of human culture in the prehistoric and historic periods. The general principle of classification throughout the whole geological series, or, in other words, the historical method, was that of *time*. Next the zoological collections were arranged, as far as the changing classification would allow, zoologically, with a special group for the Zoology of Great Britain. The botanical collections, which offered exceptional difficulty, were reserved, and are now in hand. In this manner the whole of the collections were arranged for the time when they should find their place in the new buildings, and pass under the care of the professor in each department.

A scheme of uniformity was carried out with regard to fittings and mounts also; a definite unit of size, $4'' \times 1\frac{1}{2}''$, was decided upon, and all tablets and glass boxes were made either on that or on multiples of that. This unit also ruled the size both of the drawers and of the cases in the new fittings. The system of printed labels, in which black ink represents the specific name and the red the name of the group, was also devised. In the plans of the new Museum the maximum amount of light, consistent with stability and architectural beauty, was the leading idea, while the laboratories and

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lecture-room of the whole of the Natural History Department of the college were brought as close as they could be to the Museum. The building itself was designed to suit the organization of the collections. Thus, step by step, the present Museum was gradually built up, and when the buildings were completed in 1884, the collections were transferred to the quarters which they now occupy, and where they form a centre towards which other collections are naturally gravitating.

While the museum has been rapidly growing during the last eight years, the system of museum lectures and addresses to various organizations, mechanics' institutes, schools, and the like, has been largely developed. In its present state it is used largely by students of Owens College, and is growing in favour with the general public. In other words, it is taking the place which it ought to have in the education of this densely populated district. These results, it must be observed, have only been possible through the liberality with which the Museum has been treated both by the public and by Owens College. I look forward with confidence to the time when both will be amply repaid by the impulse it is giving, and will give, to the new learning.

I do not for one moment suppose that a Natural History Museum of this kind is suitable for all places. The *genius loci* must be, in all places, the genius of the museum. The principles, however, of success are the same in all, and success can only be achieved in a limited degree if there be no signs of the worship of some of the Muses in the arrangements.

THE WORK OF THE MUSEUMS ASSOCIATION.

In ending this address, all too long, I fear, for my audience, all too short for my subject, I must add a few words as to our work as a Museums Association. It is twofold. First, we must arouse ourselves to the present situation, and note the direction which the intellectual movement of the

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day is taking. Next, it is our duty to arouse the public to the importance of museum-development, and to take care that the claims of museums as instruments of education shall not be ignored in the grants made by public bodies for the good of the commonweal.

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THE ORGANIZATION OF A BOTANICAL MUSEUM.

By F. E. WEISS, Professor of Botany, Owens College.

BEFORE entering on the discussion of the arrangements of a Botanical Museum, let us first take into consideration the function of such a museum, and especially of our Manchester Museum, with which I shall be particularly concerned this morning. I have no doubt, at some previous meeting of your Association, you have discussed, and, if you were sufficiently few to be unanimous, you may have agreed upon some definition, in answer to the question of, "What is a Museum?" This fundamental question having been answered, probably to the exclusion of the time-honoured Herbarium, as not being "on show," you will have proceeded to the next question: "What is the function of a Museum?" —that is, if this was not included in the very definition of a museum. Unfortunately, as this is the first meeting of your Association which I have had the pleasure of attending, I have not been able to benefit by any such discussions, and can only advance my own private view on the matter, which I hope my audience, with its riper experience, will not criticise too severely.

I look upon a museum as an important and valuable instrument of instruction—instruction which is directed to and assimilated by the eye. I would, therefore, not sanction the use of the term "Teaching Museum," as differing from an ordinary museum, for I consider that all museums have an educational function. It is true that some museums, attached to teaching institutions, just as the Manchester Museum is now incorporated with the Owens College, have

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their teaching function more clearly marked out, as they supplement by teaching, through the sense of sight, that which we professors endeavour, in our lectures, to teach through the sense of hearing. In that sense only—namely, as supplementing a definite course of oral instruction—our museum can be termed a "Teaching Museum;" though it should be, and is, I hope, equally a Teaching Museum to the general public.

Now, so far as I know—and I speak, of course, as a novice, and open to correction—no plan of teaching exists which is specifically a Museum Plan, *i.e.*, a plan which curators of museums have found by experience to be the best arrangement to teach certain truths. I am speaking now of the Botanical Department of a museum; for though, in their aim and function, Botanical, Zoological, and Geological Museums probably agree, it is quite conceivable that in their methods of arrangement they might diverge considerably. So, for instance, a Geological Museum might be, and is generally arranged according to distribution in time, while the Biological sections might prefer to follow the distribution in space.

In the absence, then, of what might be called a Museum Plan, a Botanical Museum should be arranged in accordance with the plan of teaching adopted by the botanical profession at large, or, in the case of a college museum, in accordance with the plan adopted in that special college.

Now, we may say in general that two such plans of teaching Botany exist. The first one is based on the principle that the student should become acquainted with the simplest—say, the unicellular—organisms first, and should gradually pass on to the more highly organized forms —should, in fact, see the building up of the Vegetable Kingdom as it became evolved in the sequence of ages. The principle is, no doubt, excellent in itself, and the plan recommends itself to many teachers, and would, I dare say, be adopted by all, if the students came to us with a mind,

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which, as far as Botany is concerned, were a blank. Unfortunately for us, and for them, that blank has often been filled up, and not unfrequently with erroneous conceptions. At any rate, they arrive with a certain amount of, sometimes, rather hazy ideas of the various parts—the roots, stems, flowers, and fruits of the flowering plant.

Now, I do not lay much weight on this matter from my own somewhat limited experience, nor is it because I myself have been taught on that plan, but as a result of a very valuable discussion on the teaching of Botany, held some few years ago at a meeting of the British Association, followed up by private discussions on the same subject, I have arrived at the conclusion—in agreement, I think, with most teachers of Botany—that it is better to start with what is known to the students, however slightly, and after having set their views to rights with regard to the structure of the flowering plant, then to proceed to the more lowly organized types, of which they generally know nothing at all. In my opinion, the first year of a student's study of Botany should be devoted especially to the development and structure of the flowering plant, and to the modifications it undergoes to suit the various surroundings and habits of life. This should be supplemented by the study of a few types drawn from the other portions of the Vegetable Kingdom, but the regular systematic study of all its branches should follow at a later period.

I will not, however, discuss the merits of these two methods of teaching; but it was necessary for me to mention them, in order that I might justify the arrangement of a Botanical Museum on two distinct and separate lines. A Botanical Museum can be, and the Manchester Museum I intend to divide into two distinct and separate parts.

The first will be a comprehensive, as distinct from a complete, systematic arrangement of the various forms of the Vegetable Kingdom, starting with the Algæ and finishing with the flowering plant; and this portion should satisfy all

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those who wish to teach Botany on purely phylogenetic lines.

The second portion—no less important, in my estimation —will embrace specimens illustrating the various morphological and anatomical modifications, especially of the higher forms of plant life, connected as they are with the physiological functions that have to be performed by the various organs. It should also illustrate the biological peculiarities of such plants as are collected, independently of their systematic position, into special groups, such as Parasites, Epiphytes, Insectivorous Plants, Succulents, and Climbers.

The first portion of the museum would then teach the Systematic Botany and Classification; the second, on the other hand, would illustrate Vegetable Morphology, Physiology, and Biology. It is, of course, obvious that with two such distinct portions of the museum duplication of specimens cannot be avoided, but need not be regretted any more than the repetition of some important fact is to be regretted in a course of lectures.

Having now specified the two portions into which the museum should, I think, be divided, let us examine a little more fully what arrangement of the material would be advantageous in each case. I will start with the systematic portion, and I wish here to state distinctly that I regard the Herbarium as not forming part of a museum. The herbarium is more of the nature of a systematic book, in which the illustrations are replaced by actual specimens, which cause it to be more accurate and detailed than any book might be. The older school of systematists would, no doubt, consider that an herbarium was all that was wanted by way of illustration; and, as far as Systematic Botany is concerned, it would go a long way, but not the whole way. First of all, certain very succulent or bulky portions of plants, such as fruits, are not of the nature to be included in an herbarium; and others, such as the Fungi, do not, at

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any rate, there show to advantage. But I think the herbarium differs chiefly from an ideal museum in this, that it is not instructive to the uninitiated—that is, to the general public. In its comprehensiveness, as well as in its arrangement in leaves, collected usually in boxes, it is in great contrast with the attractive display of objects in the museum, of which, if we cannot, perhaps, say that "he who runs may read," we may at least affirm that "he who walks round may read."

I would like, therefore, to keep the herbarium as an institution distinct and separate from the museum intended more especially for the senior student, or those of the public who are seriously studying Systematic Botany. I cannot pass over this class of student without stating how pleased I am to find that many inhabitants of this busy city are deeply engrossed in this study, and make use of every opportunity to collect and examine those examples of our British Flora which can be got in Lancashire and the neighbouring counties. It would be invidious to mention here by name any of those enthusiastic collectors, of whom Manchester may be justly proud; but it is to such as these that our herbarium, when completed, will be of enormous benefit and advantage. We have been enabled to acquire recently Dr. Carrington's invaluable collection of Liverworts and Mosses; and the noted liberality of Manchester's citizens justifies our hopes that some of the best private collections will ultimately find a home, and, I need hardly say, appreciative curators in the Manchester Museum.

The systematic portion of the museum, however, should not be so complete as to baffle the mind of the beginner, but should contain a well-chosen and representative set of genera, and in some cases, where there exists considerable difference, also of species. It will be my aim to get together such a series of specimens, separate from and independent of the herbarium. At present, however, it has been necessary to draw on our herbaria for the systematic portion of our

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museum. So far, then, we should start with a series of typical genera, and occasionally species, where difference of habit has produced considerable changes in the species, and these plants would be represented by dried specimens, similar to those found in the herbarium.

But let us now discuss for a moment other methods of illustration than that afforded by dried specimens, which in some cases, at least, as we have seen, is far from being satisfactory. First of all, we have the spirit specimens. Now, the relative values of spirit specimens, as compared with dried material, varies in every group of plants, and even within the group. Let us take the group of Algæ to start with. The Red Sea-weeds could scarcely be better shown than in the dried condition; they keep their colour, and, owing to their thin texture, there is little shrinking of the tissues, and in a museum we can very well display a type set in dried specimens. But take the group of the Brown Sea-weeds, and we find very different conditions obtaining. The tissues here are fairly bulky, and consequently a considerable shrinking takes place in drying them, and this is accompanied by so great a discolouration that the plant is almost irrecognisable. Now, our museum has been, so far, very deficient in spirit specimens, and hence the Brown Sea-weeds are hardly represented, nor could I wish to supplement them with the dried specimens from the herbarium. The same remarks which I have made about the Brown Seaweeds would apply equally forcibly to some of the succulent green Algæ, such as Valonia and Codium. Hence these two groups should be represented by spirit specimens rather than by dried material. The same applies also to by far the greater number of the Fungi. For this reason you will see practically none of the larger fungal forms in our museum, though I hope soon to add them to our collection. The only Fungi present are those which, being of small dimensions, or of a dorso-ventral habit, can be easily and satisfactorily dried. I allude to the Uredinæ, which are

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parasitic on the leaves of Phanerogams, and there cause the curious spotting of the tissues, and to the Lichens, which are usually naturally flattened, and which generally possess fairly dry tissues.

In some of the groups of the flowering plants, too, the spirit specimens of the very succulent flowers are of infinitely more value than the dried ones, which would indeed be entirely valueless in some cases. Thus the more succulent Orchids will show the entire structure of the flower, with its mechanism for cross-fertilization, wonderfully well in a spirit specimen. The colour being lost, and the tissues, if properly treated, being white, it is best to mount the spirit specimens on a dark background—dark blue, or still better, the darkest red glass, being, as far as I have any experience, the most suitable material for that purpose. Of course, this involves a loss of colour, but not the loss of the third dimension of the flower, which is so essential for the grasp of any mechanism such as that connected with fertilization. On the other hand, in some groups of flowering plants the dried specimen will show all the details, especially if the flower is dissected out after the manner of the wonderfully well prepared grasses from Dr. Carrington's collection, than which grasses nothing could be better mounted for museum and educational purposes.

In our museum, which has both horizontal or slightly inclined tables, with a transparent vertical upper portion, the dried specimens should find their place on the horizontal tables, while in the upper cases should be placed the objects mounted in spirit, and these two kinds of exhibits would vary according to the succulent or non-succulent character of the plant.

I now wish to say a few words about drawings and illustrations, which I consider not only important, but essential for the proper understanding of the dried or pickled specimens. I am very strongly in favour of giving details of anatomical structure or minute morphological

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points, by means of drawings placed by the side of the specimens. Thus, in the case of the Algæ, representations of the cells, as seen under the microscope, and which would be essential for the recognition of the plant, should be given as they would be in any book on the subject. Again, in the case of the Fungi, a representation of the Hymenium with the Basidiospores, or Ascospores, as the case might be, should supplement the actual specimen. Dr. Carrington has done that with very good results in some of the mounted grasses; but it should, I think, be done throughout the Botanical Museum. The drawings might be done by hand, or, where possible, published illustrations might be used. For this purpose I have had almost all the illustrations from Kerner's "Pflanzenleben" mounted under glass, and they will go some way towards the realization of my scheme. Some of the illustrations are of anatomical or morphological nature; but in some cases the illustrations, especially the coloured ones, represent the plant in its natural surroundings, and these illustrations are, I think, extremely interesting and instructive in their nature. Kerner's "Pflanzenleben" is a book admirably suited for this purpose, and I am pleased to be able to state that an English translation is in process of being made—a translation which will prove invaluable to all Botanical Libraries.

Finally, a few words with regard to models. The Manchester Museum contains a large number of models, but of these the greater number, though interesting, are of little use for teaching purposes. For there are models and models. A series of large models of all the varieties of gourds and melons do little except fill up the cases; but some of the carefully prepared models, as supplied by Brendel, are a lesson in themselves. If you select his models of some of the smaller objects, such as the wheat grain, the moss capsule, or the prothallium of the fern, you have an enlargement which you can dissect with your hands before the students in the lecture, or which when placed in

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the museum will illustrate the structure of these minute organs better even than a drawing. For models in three dimensions are to drawings what the spirit specimens in their three dimensions are to the flattened herbarium plant. They are meant to supplement the actual plant or organ, which, exhibited by the side in its natural size, would, on account of its smallness, reveal little or no structure, and only those models should be used which fulfil that purpose. Models of objects which are of considerable dimensions are practically useless. But the moss capsule, for instance, the details of which cannot be seen by the visitor to the museum, should be represented by an enlarged model, on which its whole structure can readily be distinguished.

To sum up, then, in the ideal museum we should see, in the systematic portion, the typical genera represented either by dried or by a spirit specimen (rarely by both); and this specimen should be supplemented either by a drawing or a model on an enlarged scale, both of which should shew the minute structure of the plant, or of a portion of the plant. Where desirable, photographs or illustrations of the plant in its natural surroundings might be added.

This would be all that is necessary for a Teaching Museum, unless we should take into consideration the economic aspect of Botany, which, however, I should prefer to relegate to Economic or Technical Museums; and if represented at all, Economic Botany should occupy only a subsidiary position in our Teaching Museum.

Having now given an outline of the method in which the various groups should be represented in the systematic portion of the museum, let us consider closely the several groups.

The Green Algæ are rather a mixed group. Some of the larger ones, like Chara, can be shown dry, and supplemented by models or drawings; others, like the bulky Valonia and Codium, would best be represented by spirit

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specimens. Others, which are entirely microscopic, like the Desmids and the Protococcaceæ, would have to be entirely dependent on illustration.

The Red Sea-weeds we have already discussed, and seen that they are suitable in a dried condition, while the Brown Sea-weeds must be in the form of spirit material.

Of the Fungi I have spoken, and concluded that some few lend themselves to illustration by dried specimens, while the greater number should be preserved in spirit. Some few of the smaller ones would be invisible in themselves, but might very well be illustrated by drawings or models, as, for instance, Mucor, Penicillium and the Yeast plant.

Liverworts and Mosses do well dried, especially the latter; the former are often improved upon by spirit preparations.

Ferns, Gymnosperms, and Angiosperms need very often dissections as well as complete specimens. In the case of the Angiosperms, too, the fruits form an important item, and might well be supplemented by drawings of the flower from which the fruit has come, if the flower cannot itself be obtained.

Fossil Botany should be included in the systematic part of the museum; but I should prefer to keep the fossils all together rather than spread them through the various cases containing the allied living forms, and keep to an arrangement following the distribution in time, so that a short historical sketch of the evolution of the Vegetable Kingdom would be presented to the spectator.

Let us now consider the morphological and physiological portion of the museum. This should, I think, start with a series of preparations illustrating the germination of the seed of Angiosperms and of Gymnosperms. These preparations are best preserved in spirit, and should represent the various stages in the germination of the seeds. Besides the normal and typical cases, some abnormal ones, such as the

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seedlings of Cyclamen, Streptocarpus, Trapa, and the Mangrove, should be shown.

Then there should follow root-structures, illustrated both by specimens and drawings, shewing the general anatomy. Then working upwards, we should find specimens of stem-structures, including the various modifications, such as rhizomes, corms, bulbs, cladodes, etc.

The leaves should next be exhibited, starting with the normal assimilating leaves, and proceeding to the leaves modified for protective and other purposes. The various types of flowers should here be dealt with not from a systematic point of view, but with regard to their biology, especially with regard to their modifications for fertilization by means of insects. Fruits, too, should in this section be considered and arranged, first, according to their morphology, and then according to their biological peculiarities, grouping them together as hooked, plumed, and winged fruits, being modified for dispersal and distribution by the agency of the wind or by animals.

Lastly, some cases should be devoted essentially to the Biological Groups, which can be collected from the most various Natural Orders, or even the various branches of the Vegetable Kingdom, in which, however, all are modified to suit some special mode of life and nutrition. Thus we ought to have all the Epiphytes and Parasites together, the Insectivorous plants, the Climbers and Succulents, unless we should prefer to treat of these modifications in each group on morphological grounds, and thus disperse them over the various organs which may be modified for the same purpose.

In this paper—for the faultiness of which I must claim your indulgence, on the count that this always is, and has especially this year, been a heavy term with me—I have not intended bringing before you any new and startling ideas as to the arrangement of Botanical Museums; but I have sketched the lines on which I intend carrying out the

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Botanical Department of the Manchester Museum, and I shall be pleased to receive any suggestions to-day, so that before I have gone too far I may mend, or, indeed, end some of my steps, if that should be desirable.

I wish to insist on the importance of a portion of the museum being given over to Comparative Morphology, very much on the lines of the well-known and well-arranged bays in the Central Hall at South Kensington.

I wish to insist, likewise, on the adequate illustration of the specimens in the collection by drawings or models, or by any other method likely to instruct, or bring out the salient features of any object of interest; and I heartily concur in this with the remark made on this point by our President in his interesting Address of yesterday evening.

Professor MIALL said that Botanical collections were, as a general rule, dull and uninteresting to all but specialists. He thought that the paper just read dealt with many of the reasons for this unfortunate fact. As was there pointed out, attempts are constantly made to display objects quite unsuited, by structure or size, for exhibition. Further, one method, and one only, was used in the preparation of objects thus exhibited, viz. drying. Mere drying rendered specimens not only unattractive, but often unrecognisable. The mode of exhibition should be varied so as to suit the object exhibited. No attempt should be made to display unsuitable objects, *e.g.*, flowers that could only be seen with a lens. This might, of course, necessitate an unsystematic arrangement, and cause serious gaps in the collection exhibited; but this could not be helped. The clear and adequate exhibition of instructive specimens was of more importance than strict adherence to scientific classification. He also thought it very advisable to exhibit living plants and animals, where possible, side by side with preserved specimens. Thus the larvæ of insects might be shown feeding upon the plants on which they are usually found. He would particularly recommend water plants as very beautiful and well suited for exhibition.

Mr. HIGGINS expressed himself much pleased with the preparations exhibited by Professor Weiss. He agreed with Professor Miall in deprecating a rigid adherence to scientific classification, where such adherence caused the exhibition of unsuitable and uninstructive objects.

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He would advise the use of short labels pointing out differences of diagnostic importance between plants. Conspicuous and attractive specimens should be selected as far as possible. Nullipores, for instance, were excellently adapted for purposes of exhibition.

Professor FLOWER considered that Zoological collections were as much in advance of Botanical ones as Art Museums were in advance of Zoological collections, and he thought that the reasons in both cases were the same. The Zoologists have worked longer than the Botanists at the subject of the exhibition of specimens, and have developed it further. The older Botanists were extremely indifferent on the question of displaying specimens in an attractive manner. Considerable advance had, however, been made in this subject in the Botanical Department of the British Museum; the British plants were now arranged so that the visitor could see them conveniently. Previously it had been necessary to summon an assistant before the British collection could be seen. The plan of exhibiting living plants, though excellent, was difficult to put in practice, living plants requiring an amount of moisture that would prove dangerous to dried specimens.

Mr. STORRIE pointed out that unless pictures were executed with great care there was great danger of their misleading the visitor. He especially criticized a picture of the Dodder, which was amongst those exhibited by Professor Weiss, pointing out defects in the drawing and colouring. He also urged want of space as a difficulty in the way of exhibiting models and spirit preparations.

Mr. PLATNAUER gave, as one reason for the dullness of Botanical collections, the wide difference between the living and the dried plant, especially in the colour of the flower. He asked for details as to the price and manufacture of the flat glass jars exhibited, and complained of the unsatisfactory nature of the cement usually used, viz., a mixture of asphalt and gutta percha.

Mr. CARR spoke of the great utility of preparations mounted in spirit for illustrating special points. *e.g.*, adaptation. He had found in practice that sewing the specimens on to sheets of mica was preferable to cementing them to glass sheets; it insured the specimen against falling to the bottom of the jar, an accident liable to happen if the cement gave way. In some cases specimens were buoyed up by glass floats. Several attempts had been made at Nottingham to exhibit living animals. The larvæ of several Lepidoptera were kept in glass cases, and fed on appropriate plants, and a double cage of Phalangers and Monkeys was exhibited. Much interest was excited in all these instances, but the difficulties in the way in many cases caused the abandonment of the scheme.

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Mr. BUTLER WOOD said that at Bradford members of the Naturalists' Club had for some time been in the habit of bringing back flowers and plants from their excursions. These plants were put into glass holders containing water, and labelled. The plan had answered admirably, great interest being shewn in the flowers by visitors.

The PRESIDENT agreed with Professor Weiss in considering Botanical Museums most important. He also fully appreciated the difficulties of making them at once useful and attractive. He felt certain, however, that the collection now being arranged by Professor Weiss would be both.

Professor WEISS admitted that Botanical Museums were, as a rule, dull, and urged that this rendered it the more necessary to take special steps to redeem them from this reproach. Living plants were, he considered, very attractive, but there were great difficulties in the way of keeping flowering plants alive. Mosses and Ferns, however, might well be exhibited; they could be kept under glass, and did not require much light. He, too, had found some difficulty with cements. For fastening plants to glass sheets he had found gelatine answer very well. He had also found a very dark ruby glass an excellent background in many cases.

Professor FLOWER gave some details as to glass jars, which he was the first to introduce into museum work. His were mostly obtained from Germany, as they were produced much cheaper in Germany than in England. The jars should be polished on one side, and the covers should have a hole drilled through them. Spirit could be put into the jar through this hole by means of a fine syringe, and could be removed, when necessary, by a syphon. The cement made by mixing gutta percha and asphalt was the best. The gutta percha must be good, and is best *old*. Nothing answers better than old strap belts.

Mr. CARR said that of late years English glass-makers had greatly cheapened jars of the kind referred to. He believed that they could now be produced as cheap in England as in Germany, and he quoted some prices in support of his statement.

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ON THE CULTIVATION OF SPECIAL FEATURES IN MUSEUMS.

By the Rev. H. H. Higgins, M.A., Chairman of the Museum Sub-Committee, Liverpool.

CAN anything be done to render Museums more generally attractive to ordinary members of the communities in the midst of which they are situated? The population of a large town is divided into various classes, each of which has its own habits and modes of life, and between them exists a good deal of the spirit of Oriental caste. It follows that they must be studied separately. Now, we are supposed to be bidding for visitors from all these classes, and to give us a chance of success, their tastes and distastes must be taken into account. We have, by our arrangements of one kind or another, to turn their indifference into good-will; and perhaps, though present prospects are not encouraging, it may not be quite so hard as we imagine to make a favourable impression. Let us begin with the highest class, including in it the higher officials and members of the Town Council. Their dwellings are far away in parks, terraces, and drives surrounding the city, and a few live within the borough. From the ordinary members of this class the museum has no visitors. Many do not know that there is such a place, and some remember to have been taken to it whilst they were children. Nor must we infer from this that they are incapable of appreciation. What they say is that their hours are so occupied, and that there are so many other engagements, that they really have no time for properly seeing a museum. Yet their carriages, in mile-long processions, bear thousands to crowd the boxes and the stalls at the Philharmonic Hall. The theatres, moreover, and the Autumn Exhibition, and even the

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half-crown hours at the flower shows in St. George's Hall, have a fair sprinkling. Well to do, and many of them well educated and intelligent, it seems strange that they should ignore such an institution as a museum. And there are under my own observation other similar instances of neglect, *e.g.*, Liverpool has had, for many years, a collection of almost matchless examples of early Pictorial Art. If some of these pictures could have been transported to a gallery in Genoa or Florence, they would have been seen by Liverpool boys and girls, and their friends, with unaffected admiration, for many of them are quite capable of it.

Is it our fault that, amongst these delicately brought up fellow townspeople, the very name of a museum falls flat and jejune? Doubtless it may seem strange to hear so much stress laid upon winning visitors from among the upper ten; but it may be safely asserted, that if you win these, the plainer sort will have the full benefit, just as in our Philharmonic Hall the services of Patti or Neruda must be retained to fill the stalls and boxes; but it is the nobodies in the side galleries that most truly enjoy the rich musical repast. What, then, fills the stalls and the boxes at such high prices as have to be paid? I believe it to be a wish to lay by a store of topics for conversation and subsequent intercourse with sympathizing friends; and a most praiseworthy motive it is. In a great measure it is the very same incentive that brings visitors to the Autumn Exhibition of Pictures—the pleasure of the moment—but chiefly, something to talk about. So, then, the *élite* of this sort are not mere apathetic stay-at-homes. They will not turn out for a lecture, or for the meeting of a learned Society; but for a first-rate opera, or in their thousands to take part in a function in which a member of the Royal Family is expected to be present. It is empty to assert that they go for fashion's sake. It is their going that makes the thing fashionable. Why they go, we have already considered.

It is not for a moment to be supposed that a museum can be brought to compete on equal terms with entertainments

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which are ever varying, and in which human life is displayed in its most fascinating aspects; but when men and women whose æsthetic qualifications are not robust but require to be treated very tenderly—when such uninitiated ladies and gentlemen never miss a really high-class occasion, it seems as if the social stimulus must be in them a motive much stronger than the artistic. All honour to them, they have the better thing. Now, it is just when seen in this aspect, that there appears to be some hope of improvement in the present relations between the museum and the members of the community surrounding it, especially with those of them who might be most benefited. First, as far as possible must be removed the sad misapprehension, of long standing, respecting what is to be had by a visit to a museum. Such a visit is held to involve a prolonged wandering between rows of lifeless natural objects, a series of one kind coming to an end, and being succeeded by a similar series of another kind, and justice having to be done to the collection only by traversing every room and every gallery, and, perhaps, by ascending the great museum stairs to perform a similar perambulation in the rooms and galleries on a higher elevation, happy if not threatened with another storey. All this may be very well for us; but the visitor uninitiated in Natural Science, what can he find to talk about, for that is what he seeks—something leaving a distinct impression, such as he gains, even if he is not very æsthetic, by a solo from Madame Neruda, or a picture by Luke Fildes. Only a step, perhaps, but a step in the right direction, might possibly be promoted by the freer use of features in Museums of Natural History.

It would be a mistake to lay much stress on the significance of the term "feature." Any segregation, in which few or many natural objects are brought together, on some plan conspicuously not the same with that of the arrangement of the whole collection—as, for instance, where a fish, a mammal, and a bird should be exhibited in close proximity—any such a group may be termed a "feature." It is a conspicuous

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departure, for some special purpose, from the normal order of arrangement, in favour of securing a desired impression. As a fair example of a museum feature may be quoted an osteological arrangement adopted by our highly respected member, Mr. T. J. Moore, at Liverpool. The bones of the extremities of certain mammals were so disposed as to invite comparison between homologous bones in man and the lower mammalia. This cannot be called a conspicuously prominent feature, but it has the required virtue of imparting distinct impressions. Take the case of a visit from half-a-dozen lads of the Sixth Grade in one of the Board Schools. By a few words of explanation, such as might be given even by an attendant, their curiosity might be elicited; for the very things themselves, and not the pages of a handbook, would be before them. In pursuance of the design of the feature they would be directed to compare the osseous structure of the fore-limb of a Lemur or of a Bat with that of the arm of a man. After such a lesson it would hardly be too much to expect the boys to ask to be shown a Lemur or a Bat—creatures with such extravagant bones in their limbs; for in the osteological feature they had found characters such as they could understand and talk about, one with another. Probably there are few museums unable to furnish materials for features of this unpretentious but instructive nature.

During last spring, circumstances induced me to enter upon an experiment in the construction of a feature, which I will describe, because, in practical attempts, even mistakes may be instructive. My thoughts had been drawn to the question whether Pictorial Art could be made increasingly available in representing the environment of life history groups—say of birds. An Albatross had very recently been presented to the museum. It was a noble specimen, and had been brought from the Antarctic Regions, quite entire, preserved in ice. This may be worth notice, because Mr. Cooke, of Renshaw Street, Liverpool, the able taxidermist, expressed himself strongly as

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to the advantage of having specimens so preserved. Here, then, was a worthy starting point for the furtherance of my design to invite the assistance of Pictorial Art.

The environments must clearly be in close keeping with the objects displayed. If ocean birds should be selected for illustration, belongings to the sea and to the sky would alone require to be depicted. These, however, must be wrought so as to convey vivid impressions of expanse and freedom of life and motion. Everything injurious to such conceptions must, as far as possible, be sacrificed.

It is needless to dwell here upon museum limitations and obstructions. The question which clearly rises is this, whether it can ever be desirable to sacrifice a large space—say the whole end of a gallery—to an impressive feature. Such a proposition would be likely to convey a kind of shock in quarters where museums are regarded as structures dedicated to systematic taxonomy, immeasurably more than to the loving cult of nature.

It is not for me to submit the proposition except as an inquiry; but a few particulars of the present experiment may be added.

The case for the ocean birds is about fifteen feet in length, by about nine feet in height, outside measurement. The frame is elevated nine feet from the floor, resting on the ordinary wall cases. The painted canvas at the back has an area of 130 square feet, divided by the horizon at one-third of its height. The feature was designed to illustrate the life history of ocean birds, of which the case, before alteration, had contained six or eight specimens. It became evident that, to give the designed impression of oceanic expanse, fewer birds must be employed. Ultimately they were limited to two specimens only—an Albatross and a Frigate Bird. It seemed very desirable to introduce a pair of Tropic birds, but, though beautiful and comparatively small, it was instructive to mark how entirely the scenic effect was destroyed by their introduc-

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tion. It was clear that the whole of the case must be devoted to the two specimens. Subsequently, even the label was banished, and its purpose supplied by a descriptive tablet, suitably affixed near the point of view. On the left side, rather low down in the case, the Albatross is seen retreating before an approaching storm of wind and rain, its snowy plumage contrasted with the dark clouds above the horizon. The storm, however, has not encroached upon the right side of the case, where brightly coloured wind-clouds, topped by cirri, and the blue sky beyond, form a canopy. Beneath this, the ebony-hued Frigate Bird, according to his wont, is cruising aloft, on the watch for some fish-laden sea-fowl on which he may pounce, making the victim disgorge his prey, to be caught by the downward rush of the Frigate Bird before it reaches the water. The colouring was executed in distemper by Mr. Isaac Cooke, marine artist, of Liverpool. The space occupied is not valuable, for no part of it is on the line. It is passed by about 1,000 visitors on every open day. The entire expense is comparatively small, owing mainly to the enthusiasm with which the pictorial part was undertaken by a highly competent marine artist.

We are familiar with the union between Science and Art in every really great picture; but the true artist hides his science so that it shall be felt, but not seen. Nature is here prominent in the form of the wild ocean bird that once lived, and found well-nigh a constant home, in the yielding air. Peradventure Art may not be misdirected in being invited to help our frail powers of thought to cope with such a scene.

Professor FLOWER had found the same indifference to museums that Mr. Higgins complained of among educated and refined people. He believed that picturesque groups would be very useful in overcoming this apathy and arousing intelligent interest. A few well-mounted objects of general interest, such as the jar of Sargasso Weed that Professor Weiss had shown, would be sure to arrest attention and excite healthy curiosity.

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Mr. HOWARTH said that he observed among the visitors at the Sheffield Art Gallery on Sundays, there was a fair number of the upper classes, more, proportionately, than on week-days.

Mr. HIGGINS maintained that every effort should be made to find out by actual observation which department of a museum most attracted the public. He himself had always found that aquaria aroused the greatest interest; they were always surrounded by visitors.

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LOCAL MUSEUMS OF ART AND HISTORY.

By the Rev. Canon Hicks, M.A.

TO an audience of gentlemen who are largely concerned in the organization of Museums, and who have much experience of their management, I wish to speak with becoming modesty, as only a student and visitor in museums —as one of that great Public for whose instruction and enjoyment they exist. Many reflections and impressions have come to my mind, but I would confine my remarks to one especial point, not fearing the charge that I shall seem narrow or one-sided; for if a museum is not a happy hunting-ground for your rider of hobbies, where, I would ask, should he go for a canter?

I want, then, in a word, to plead for a larger recognition of Man—Man as civilized, and the maker of beautiful things, equally with, or even more than, Man as a curiosity of anthropology—in the galleries of museums. I would plead also for human culture in the various phases of its development, and its manifold creative activity, as deserving of as much recognition as the Saurian, the Dodo, or the Gorilla in our local collections. I feel very often that museums would delight me more, and interest the public no less, if they reflected the famous maxim, "The proper study of mankind is Man."

The old-fashioned Museum of Curiosities has passed for ever away, with its ducking-stool and leathern bottèl, and the slippers of Queen Elizabeth, and Guy Fawkes' Lantern, and Oliver Cromwell's spurs, and the waistcoat worn by the Duke of Monmouth on the scaffold. All these objects of our childish recollection have somehow disappeared.

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But to the student of Man, and human culture, the local museum is now often scarcely more helpful than of old. Indeed, these old curios, though perhaps of dubious authenticity, had yet a personal and historical interest.

I say not one word in disparagement of the value of Natural History collections, of the Geological specimens, of the shells, of the stuffed birds and beasts and fishes, which occupy so much space. I am free to allow that the animals are likely to be the most attractive part of the show. The beautiful Natural History Museum at South Kensington, remote though it is from the people at large, draws more visitors than the more sombre collections in Great Russell Street. It is right that it should be so. As long as so many of our people live in smoky cities, Natural History collections are a moral as well as a scientific necessity. Nor need I urge the importance of fostering the study of Nature, and the advancement of natural knowledge.

The rapid growth, also, of Technical Education gives rise to another aspect and function of museums. Round every Technical School must be grouped the galleries of a museum, to illustrate the industry of the locality in every possible way—the new inventions, the methods of manufacture, the history of those methods, and the various forms of the finished product. Thus at Birmingham a considerable space in the town museum is rightly devoted to a splendid historical collection of all kinds of guns and muskets.

But quite apart from manufactures, and even apart from the study of inferior Nature, animate or inanimate, I would crave the larger, freer illustration of the history of the human race and the human spirit, as exemplified in the creations of man's brain and hand.

In many museums History claims a prominent place, as of obvious right. In towns which stand on famous ancient sites, the remains of the past have a commanding interest. Such are the museums of Bath, of York, and of Chester. The latter, indeed, has been overcrowded with the monu-

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ments which have been extracted within the last few months from the ancient walls, to settle for ever the fact of their Roman origin, and to add a new chapter to the history of the Roman occupation of Britain. But in every local museum there are remains of classical antiquity, which deserve a more honoured place. I remember, for example, the Roman inscription in the museum of Whitby. There are also Roman tombstones turning up occasionally on old Roman roads, which would be happier in a place of honour in the local museum than lodged in the parson's rockery, or banished to an obscure corner of the British Museum. Roman pottery and Roman coins also should, if possible, be retained in the locality where found.

If intelligent care were bestowed on such objects—if they were historically grouped, and their interest set forth in catalogues and labels, they would probably attract other and more valuable gifts. I have in mind the beautiful little collection of Greek marbles at Leeds, which I had the pleasure of describing in the *Hellenic Journal* of 1890.

Let it not be said that such collections are of little interest to the general public. I know, by pleasant experience, that few subjects are more attractive to University Extension students than the ancient civilization and Art of Greece and Rome. Indeed, it is a striking fact that, precisely at a moment when classical languages seem to be losing their supremacy in the curriculum of study, the interest in the life and the Art of classical times is growing wider and deeper.

This interest has, of course, been vastly stimulated of late by the surprises of excavation. The public mind has been startled and delighted by the results of the science of the spade. The very faults of H. Schliemann proved an influence for good, by interesting the popular mind. And since then, the interesting work done by the Egyptian Exploration Fund, and by Mr. Flinders Petrie, not to mention others, has, amongst other advantages, enriched many a

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local museum with priceless treasures, and thereby done very much to stimulate historical study.

But apart from such gifts, there must be many local collections of coins, or of Greek vases, or of gems, or terra-cottas, which, if our provincial museums laid themselves out for such things, would find their way, sooner or later, to their cases. And these objects are not only of deep historical interest, and of great intrinsic value, but are also of the greatest beauty in colour or form or design. Of course, such collections would belong only to special periods. There would be great gaps of time left unrepresented. Only a British Museum can be universal. Yet with a little care it would not be difficult to secure a fair representation of each of the great periods in the history of human culture, and to exemplify, for example, the progress of Greek and Roman Art from Homer's time down to the fall of pagan civilization. An occasional cast, a good many photographs, and a careful observance throughout of chronological sequence, would make many a classical student happy, and prevent many a man, who is half forgetting his Latin and Greek, from losing his interest in the historical and artistic side of ancient civilization.

But the principle I urge will carry us much further. It holds as true of Mediæval as of Græco-Roman culture. The Fine Arts and the Industrial Arts of the Middle Ages, of the Renaissance, and of the modern time need more systematic and chronological illustration in our museums. Photographs go a great way; the loans from South Kensington do yet more. Best of all is it to make wise purchases for your museum, or rather to attract suitable gifts. Ecclesiastical and other metal work, wood carving of various periods, occasional casts and models—but all arranged chronologically, and with due regard to artistic effect—would help, more than all the efforts of historians, or even the novels of Scott, to teach the average British Philistine that civilization did not begin with the steam

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engine, and that the Middle Ages were not all dark. Nor should Painting be forgotten. I may seem to be wandering from the point, but surely the popular appreciation of Art loses greatly by the separation of Painting from the humbler yet sister arts of Decoration and Design. In vast Metropolitan collections such a division is necessary. Your National Gallery and your British Museum cannot be one. But in smaller collections the case is different, and Birmingham has set a good example by combining Industrial and Fine Art under one roof.

My subject is a fruitful one, and suggests many applications. But I need say the less because the main point was so well put in the excellent Address of our President. Local museums must obviously vary in their character with the locality. The nucleus of each depends upon local needs and opportunities, and this nucleus determines the prevailing character of the whole. Only, let not humanity be forgotten, and let the interest in humanity be really human. Let history and civilization, in its larger and nobler developments, claim the place of honour. The Greek statue and the Roman mosaic are not less interesting than the Egyptian mummy; and the works of the Italian goldsmith or the English potter are even more delightful and instructive than the beads or the battle-axe of the African chief.

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THE MANCHESTER ART MUSEUM.

By T. C. Horsfall.

IF any person wished to educe sweetness and light—saccharin and coal-gas—from the chaos of coal, he might make many mistakes in method, and waste much effort, time, and money in discovering the best and most economical kind of apparatus to use; but there would, at least, be a limit to the amount of error possible to him. For he would have a clear idea as to what he wanted to make, before he began to try to make anything; he would ascertain, as exactly as possible, the constituents of the substances he wished to have; and, at greater or at less cost, he would get saccharin and coal-gas, and not something else. These chemical symbols of sweetness and light are very interesting and valuable, and well worth the expenditure of much time and thought and money; but their value is infinitesimally small in comparison with that of the sweetness and light, the true civilization, of human society. What a great pity it is that the Christian Churches, Philanthropic societies, Education Departments, Town Councils, and other sets of persons who desire to educe these invaluable things from the chaos of our existing semi-barbarism, will not be at least as reasonable as the least reasonable manufacturing chemist, and, before trying to get results, ascertain what are the essential constituents of the results they desire! It is true that real civilization is a much more complex thing than any product of coal; but the master-truths for would-be reformers should be, that it is absolutely certain that civilization, like saccharin, cannot exist unless certain elements exist and are brought into effective contact;

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that the principal constituent elements of civilization can be ascertained as surely as those of saccharin; and that it is not more impossible for the coal in a mine to turn into saccharin and well-purified gas without the intervention of a skilful chemist, than it is for the mass of the people now living in England in semi-barbarism to become civilized unless their guides and rulers will take the trouble to get to know what are the elements of civilization, and will then try to supply and combine them.

With the total result of an exhaustive analysis of civilization we cannot so far leave our last as to concern ourselves here; but the great importance of all our work depends on the facts that any careful analysis reveals that, whatever else be essential elements, knowledge of Nature and of the best and most interesting of the works of Man certainly is one—it being quite certain that any community which does not possess a large amount of knowledge of the wonderfulness and beauty of the earth, and of interesting products of human art and skill, must be licentious, brutal, barbarous, and that the mass of the people can gain this kind of knowledge only by the help of museums of different sorts.

My task is to explain the peculiarities of the apparatus devised by a society of analytical and synthetical social chemists, known to the world as the Committee of the Manchester Art Museum, for the purpose of bringing these elements of civilization into effective contact in the lives of as many as possible of the inhabitants of Manchester.

Partly because men and women are not likely to come to museums, and to acquire there the vast amount of knowledge which even old men and women could gain in such places, unless they have in childhood gained some interest in the kinds of things found in museums; but chiefly because human beings are most teachable while they are children, and, moreover, at this most docile age are compelled to go to school every day, while in their less teachable adult condition they can at most be induced to

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come now and then to a museum, the Committee resolved, at a very early stage in their career, that as many as possible of the Elementary Schools in Manchester should form part of their museum, or, in other words, that some of their possessions should hang on the walls of as many schools as possible. This resolution has already had rich results. I believe that if only we can induce one or two intelligent well-to-do people to supplement for each school, or for a small group of schools, in which they are most interested, the work done by the museum for a large number of schools, it may prove to be one of the most fruitful resolutions ever formed in connection with a museum. At first the committee hoped to be able to supply every department of every Elementary School in Manchester and Salford with a circulating collection of pictures and other works of Art; but, after several years of experience of the work involved in supplying only forty-four departments, they find that they must not attempt more than to supply all the departments of all the schools in about half of the Manchester School Board District—the half so supplied including the part of the town which surrounds the museum—and that they must leave the rest of Manchester to be supplied by other Associations.

The system on which the Committee work is this:—Twelve pictures are lent to each school department, and at the end of a year are replaced by another set of twelve pictures, and are moved on into another department in the same or a neighbouring school. Thus every year each department receives twelve pictures, which have the interest given by novelty for teachers and scholars. The collections lent to schools are divided into two classes—(1) those for use in the Infants' and Junior Departments; (2) those for use in the Departments for older Boys and Girls.

For the Infants' and Junior Departments we have now sixty collections, each of twelve pictures, and forty more collections are being formed. For Boys' and Girls'

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Departments we have already forty-four collections, and are forming sixty more. Six months hence we shall have two-hundred-and-four collections in all. There are three-hundred-and-fifty departments in all the Elementary Schools of Manchester, so that the Committee will supply considerably more than half the whole number.

I will give a list of the pictures in one of each of the two classes of collections. This is one of the collections for Infants' and Junior Departments:—

1. Sixteen Chromo-Lithographic Plates, from Cassell's "Familiar Wild Flowers:" Hedge Stachys, and fifteen other flowers.
2. Sixteen Chromo-Lithographic Plates, from Cassell's "Familiar Garden Flowers:" White Begonia, and fifteen other flowers.
3. Landscape, "A Sunny Glade," Chromo-Lithograph, after Birket Foster.
4. Four Plates of *Woodcuts of Animals, from Brehm's "Tierleben:" Tortoises, Crocodiles, Lizards, and Serpents.
5. Chromo-Lithograph, after a Drawing of Orchids, by E. Vouga: Houlletia Brocklehurstiana, and Dendrobium Infundibulum.
6. Four Plates of Hirt's Geographical Pictures, Woodcuts—Japan, Australia, and Egypt.
7. Sixteen Chromo-Lithographic Plates, from Cassell's "Familiar Birds:" Nightingale, and fifteen other birds.
8. Two Autotype Plates, from Hofmann's "Kommet zu Mir:" Jesus and the Woman of Samaria, and Jesus and the Son of the Widow of Nain.
9. Caldecott's "Farmer's Boy."
10. Six Chromo-Lithographic Plates, from Lord Lilford's "Birds of the British Islands:" Jay, Jackdaw, Magpie, Raven, Heron, Carrion-Crow.
11. Twelve Chromo-Lithographic Plates, from Morris' "Butterflies:" Black-veined Butterfly, and eleven others.
12. Four Chromo-Lithographic Plates, from Roberts' "Holy Land:" Jericho, Valley of the Jordan, Jerusalem from the South, Jerusalem from the Road to Bethany.

The Collection for Departments for Boys and Girls contains:—

1. Four Photographs of Scenes in the Lake District: Windermere from Lowwood, Head of Windermere, Stock-Ghyll Mill, Bowness and Windermere.

* In the new collections these are replaced by the coloured plates of the new edition of Brehm's "Tierleben."

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2. Sixteen Chromo-Lithographic Plates, from Cassell's "Familiar Wild Flowers:" Greater Willow Herb, and fifteen other flowers.
3. Twenty Chromo-Lithographic Plates, from Cassell's "Familiar Trees:" Hawthorn, Elder, Alder, Holly, Laurel, Plane, Box, Yew, Cypress, and Spindle-Tree, and their Foliage, Blossoms, and Fruit.
4. Twelve Chromo-Lithographic Plates, from Morris' "Butterflies:" Swallow-tail Butterfly, and eleven others.
5. Chromo-Lithograph, after a Drawing of Orchids, by E. Vouga: Trichophilia suavis and Phajus Wallichi.
6. "The River Danube, near Vienna," Oleograph, published by Hoelzel.
7. Twelve of Langl's smaller Pictures to illustrate History: Appian Way, Colosseum, Pantheon, Castle of St. Angelo, Pompeii, House of the Tragic Poet at Pompeii, Theatre at Taormina, Palmyra, Church of San Vitale at Ravenna, Church of St. Paul before the Walls at Rome, Church of St. Clement at Rome, Church of St. Sophia at Constantinople.
8. Four Etchings of Scripture Subjects, by Bida: "The Departure from Egypt," and three others.
9. "St. Louis and the Sire de Coucy," Photo-Engraving, after Merson.
10. Two Printed Calicoes of beautiful Colours and Patterns, with Note on Flat Decorative Design, by Mr. W. Morris.
11. Autotype Copy of a Plate of the "Liber Studiorum," The Mildmay Sea-piece, with Notes by the Rev. Stopford Brooke.
12. Nine of Hoelzel's smaller Physical Geography Pictures: Pillar-Cape in the Arctic Circle, Hammerfest, Giant's Causeway, Heligoland, Stettin-Haff, Giant Mountains, Weckelsdorf Crags, Danube near Vienna, Plain in Hungary.

In every collection for the Infants' and Junior Departments there is one frame with sixteen plates of Wild Flowers, one with sixteen plates of Garden Flowers, one with coloured plates of Birds, one with Geographical Pictures, and one with Caldecott's or Crane's illustrations to a tale and with the text of the tale, and one of Scenes in the Life of our Lord; so that when a school has had six collections the children will have seen pictures of ninety-six different wild flowers, the same number of garden flowers, and a large number of birds, and of other animals, and of interesting places. But as there are only twelve pictures in each collection, and there are many more than twelve different kinds of things of which children ought to know the beauty and interest, it

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is necessary to show some sorts of pictures only in every second collection, and some in only one collection in every three. Thus a coloured landscape comes into only two in every three collections, its place being taken in every third collection by plates of common kinds of trees, and of their leaves, blossom, and fruit. Plates of Orchids, also, are in three out of every four collections, and are replaced in the others by pictures of flowers and birds treated somewhat decoratively. Butterflies are in one of every two collections, and are replaced in the others by the coloured plates from Leutemann's "Animals from the Life." Similarly half the collections have large coloured plates of Scripture subjects, published by the Religious Tract Society, and the others plates from Roberts' "Holy Land."

Each collection lent to a department for boys or girls also consists of twelve pictures. In addition to all the kinds lent to the departments for infants many others are used, and a smaller number of each kind, therefore, has to be shown. Besides the kinds included in the collection described, the following are used in some of the other forty-four collections of this class:—Photographs of beautiful places which can be reached easily from Manchester; Chromo-Lithographs of such pleasant scenery as can still be found close to the town; Etchings of beautiful towns in Belgium; Pictures of English birds, and of foreign birds and other animals, of Orchids and Humming Birds; Photographs of flowers and plants, to show how much beauty of form accompanies beauty of colour in them; Pictures to show how much beauty there is in the commonest dry leaves, weeds, and insects; Caldecott's and Crane's illustrations of tales; Pictures of places in the Holy Land; Langl's large pictures of fine buildings, which are intended to illustrate history; Hirt's geographical wood-cut pictures; Hirt's historical pictures; representations of beautiful wood-carvings and iron-work, intended, as are the examples of textile fabrics, to train "taste;" good wood-engravings and line-engravings framed together, which are meant to create an interest in Art processes.

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Each picture has a label which explains its subject, and tells that it is a chromo-lithograph, or a wood-cut, or whatever else it may be, and that the way in which it is made is explained in the Art Museum. If the picture be cheap enough to be bought by workpeople, its price is stated, and often the title and price of a book describing its subject are mentioned; and, as frequently as possible, reference is made to the Manchester Free Libraries, the Art Gallery, the Owens College Museum, the Botanical Gardens, and the public parks, so that the pictures may give knowledge of, and desire to use, all the resources of civilization which Manchester possesses. The pictures of landscapes have a label which gives some of the reasons for acquiring love of beautiful scenery; the labels to the etchings of towns in Belgium point out that towns are not necessarily hideous, and ask the children who look at the pictures—future rulers of Manchester—to think how much pleasanter their lives would be if their town were as beautiful as Bruges or Ghent, and, like them, contained trees and pure air; and it begs them to make up their minds that when they are men and women they will help to make healthy life possible in Manchester.

No charge is made to a school for the pictures lent to it, or for any injury not due to gross neglect, and the Museum defrays the cost of carriage and hanging.

Twelve pictures, renewed each year, if used by well-informed, well-trained teachers, can, of course, give children a great many clear ideas; but it is desirable that children shall see, besides the twelve pictures lent to one department, many others which can supplement the ideas given by the twelve, and that they shall gain enough knowledge respecting their school pictures to feel interest in them as pictures, and to feel interest, also, in the way in which pictures come into existence. The Committee of the Art Museum have, therefore, tried to arrange that children in schools near the museum shall come to it frequently with teachers, to see its contents and to receive some instruction. But as it is impossible

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to obtain regular attendance out of school hours, the Committee have asked the Education Department to allow time spent by children in the museum under the charge of a teacher to count as time spent in school. So far the Department has refused to allow this, as it says that the time spent in school is too short to permit of any of it being taken from school subjects. The Committee, on the other hand, believe that just because the time spent in school is so very short, it ought to be used to the greatest possible advantage; and they trust that the Department will eventually see that time given to, say, monthly visits to a museum, which are likely to lead to a life-long interest in knowledge, is better spent than if given to lessons of grammar or spelling, which are found to give a very large number of children a life-long hatred of the acquisition of knowledge.

The Committee would much like to increase the number of pictures in each loan collection; and they hope that other societies or individuals will supplement their work by lending to schools series of pictures of geographical and historical subjects, to be shown in rotation in illustration of the subjects of lessons; and small geological collections to connect schools with the Owens College Museum, as their loan collections connect schools with the Art Museum.

In order that the teachers trained in the Day Training College in Manchester may know how to use pictures to the greatest advantage, the Committee of the Art Museum have offered to keep the rooms in which training is given well supplied with pictures. Unfortunately the offer cannot be accepted at present, as the rooms used are not suitable for hanging pictures in.

In the arrangements of the Art Museum itself, the Committee have had to have regard to two facts: that very few persons in Ancoats are likely to come often to a museum if they know that they will find there only pictures and sculpture; and that of those who can be induced to come, most are at first very ignorant, both of Art and of

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Nature. Partly for the purpose of bringing the same persons again and again within the range of the influence of pictures, sculpture, architecture, and the industrial arts, but quite as much because they need, not less than that influence, the influence of music and literature, we have every week during the autumn, winter, and spring, two entertainments of music and recitations, varied by an occasional dramatic performance. We have also, every week, readings, story-telling, or music for children; and we have free drawing, wood-carving, and clay-modelling classes. Having attracted visitors, we seek, first of all, to give to those who will attend to more than entertainments some of the knowledge and love of Nature which it is one of Art's most useful functions to give or revive. To this end we have collections of the most beautiful pictures we have been able to get of what may be called the elements of landscape—of wild and garden flowers, trees, birds, and other animals. With simple representations of all these things we show also examples of the adaptation of their forms to use in Decorative Art. Having sought by these means to reveal some of the beauty and interest of the elements of landscape, we try to induce some of our visitors to study the originals singly and in combination, by showing them a collection of pictures of beautiful or in other ways interesting places close to Manchester, or easily accessible from it. Every one of these pictures, and, indeed, almost every picture in the museum, has a label which explains its subject; gives its price, if it be of a kind of which a workman could buy a copy; states that it is an oil-painting, or whatever it may be; and if it be an engraving or etching, states also that the way in which pictures of the kind are made is explained in another part of the museum. We have also collections of pictures showing the results of the action of the great forces of Nature, intended to give an intelligent interest in the various forms of the earth's surface, and in different kinds of scenery. There are collections of pictures of landscapes in various parts of the world; of pic-

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tures of human life in many different countries; of portraits; of pictures of historical scenes, and of scenes in great fiction. We have sought, by keeping pictures of similar subjects together, to make the study of them as instructive and as little tiring as possible.

For the enjoyment of Art, it is, of course, necessary not only to have knowledge of Nature, but, too, to know something of the history of the development of Art, and to know, at least, how some kinds of works of Art are made. We have a considerable collection of pictures carefully arranged to illustrate the history of painting. Each picture has a label which explains its subject, and, in many cases, its connection with the rest of the collection. For sculpture and for architecture there are similar collections.

To give some knowledge as to how some kinds of pictures are made, we explain the processes by which those kinds which most people see most frequently—wood-cuts, chromo-lithographs, line-engravings, etchings, etc.—are made; we show in cases the tools, the blocks, and plates used in the processes, and we give series of examples showing how such arts as wood-engraving, line-engraving, and etching have been developed.

To give children wholesome recreation by means of pictures, and therefore to interest them early in pictures, we have a children's room, in which, with many other pictures of kinds intelligible to children, there are many of Caldecott's and Crane's delightful series, with the stories which they illustrate.

In order to reveal to workpeople the important truth that a very small house can be made pleasant to the eye, there are two model rooms, a sitting-room and a bed-room. The museum also contains small collections of products of the principal Industrial Arts, and many pictures of more beautiful products than we could afford to obtain.

As the whole system of the museum has been formed and is maintained for the purpose of giving kinds of know-

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ledge which we know to be necessary for healthy life, I need hardly say that the museum is open at the times when it is most easy for workpeople to go to it. Tuesday is the Curator's day of rest, and it is then closed all day. On Sunday it is open from 2 to 5 p.m. On all other days it is open from 2 to 5 p.m., and from 7 to 9.30 p.m.

The museum has been visited by a large number of members of societies, who have examined its contents carefully, generally under the guidance of members of the Committee or of the Curator; and all visitors of this kind who have expressed any opinion at all have said that they have learnt a great deal from its collections, and in a very pleasant way. The entertainments, also, have had a very humanising influence on a considerable number of people. On this subject the Rector of the parish in which the museum stands, the Rev. George Fry, has given very gratifying testimony. Speaking at the last Diocesan Conference in Manchester, in October, 1891, on the subject of the opening on Sundays of the museum, he said:

"I feel that I should be wanting in my duty if I did not offer a few remarks on the Sunday opening of an institution which is situated in my parish, and which has been alluded to more than once in this debate. Some years ago I had grave doubts as to the expediency of opening Art Museums and Picture Galleries on Sunday, even during the afternoon, between morning and evening services; but the experience gained by the opening of the Manchester Art Museum has considerably altered my views on this subject. If I were asked the question, 'Has the opening of the museum directly benefited your congregation?' the answer would be in the negative. At the same time I am perfectly convinced that it has been of an indirect benefit to us in this way. One of the objects of the Art Museum is to improve and cultivate the musical taste of the working classes, and I can discern already a greater disposition in those around me in Ancoats to listen to any music that is worthy of the name. For the

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last several years we have had, from time to time, Oratorios and Services of Song on Sunday afternoons, and my experience is that we find our people have attained to a somewhat more refined taste than in years gone by, and that these services are much more largely attended now than they used to be. I attribute this, in our parish at least, to the work of the Art Museum. Further, I find that in several cases those who have merely attended musical services now and then have been gradually led to a regular attendance at church, and, by the grace of God, lead better and holier lives. I wish the Committee every success in their work, and trust that they may be spared many years to carry on their truly philanthropic work. *The Manchester Art Museum cannot be justly regarded as a rival to the churches or chapels, but rather as a source of help, and as an assistance to the truest and highest conceptions of religion which are implanted in mankind.*"

On the other hand, the museum does not attract a large number of people when only its pictures and other collections are to be seen there. For in Ancoats, as in all other places, amongst a large number of people who behave perfectly well wherever they may be, there are some who behave very badly unless they know that they are being carefully watched; and, as the museum contains many rooms, and can only afford to employ one Curator, the Committee have found it unsafe to encourage visitors to stay long in the museum by providing chairs in all the rooms. Then, too, the museum is made less attractive than it would otherwise be by the horrible filthiness of the air of Ancoats. The museum is too poor to keep itself thoroughly clean and bright.

In the year from the beginning of April, 1891, to the end of March, 1892, 35,647 persons visited the museum. It is very interesting to notice the difference of the attendance on different days in the week. From the beginning of April to the middle of October there were no entertainments. During this period the average daily attendance was 62; the average attendance during the five-and-a-half hours of

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each Saturday only 38; and during the three hours of each Sunday 128. From the middle of October to the end of March there were concerts on every Wednesday and Saturday night. During this period the average daily attendance was raised by attendance at the concerts to 183; on the Saturdays, though in the evening concerts were given, it was, in five-and-a-half hours, 145; for Sundays, in three hours, 163.

The Committee believe that the usefulness of a museum is greatly increased if, in addition to enabling all who care to do so to acquire knowledge, it provides very wholesome recreation for a large number of people who do not seek knowledge; and they have decided, therefore, that if possible they will build this year a hall large enough to hold 1,000 or 1,200 people, and provide it with a good organ. Besides enabling them to attract a large number of people to hear good music, this will give them, in a gallery, much space for the exhibition of a series of pictures which they have not yet been able to show, and also for the exhibition in cases of a very interesting collection of the common products of the Industrial Arts of Japan—things made by the Japanese for themselves, and not for Europeans—which the kind help of Mrs. Ernest Hart has enabled them to obtain.

Copies of the handbook of the museum, which explains the connection between the different collections, are placed in this room for your acceptance. Two other penny handbooks are sold in the museum—one on "What to look for in Pictures," the other shewing the place which love of Nature and of Art must have in a healthy life.

MR. PATON was glad to see in these papers a clear indication that the Association did not, as was sometimes asserted, neglect Art. Both papers contained matter of the highest interest, though they added to the bewildering list of subjects that the average curator was advised to take up as important. He then proceeded to point out the difference between a Science Museum and an Art Museum; the function of the former being to instruct, that of the latter to give enjoyment. He should consider the Ancoats Museum to be, strictly speaking, a Science Museum, its province being mainly to

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instruct in the history and technical processes of Art. Historical Museums, such as those dealt with by Canon Hicks, he considered very useful; they brought back the past with a vividness that no amount of reading could achieve.

Mr. VIRGO spoke of his experience at Queen's Park Museum, where work in many respects similar to that of Ancoats Museum was being carried on. He found, like Mr. Horsfall, that entertainments were very useful in drawing to the museum many people who might not otherwise have come. Loan collections had proved of great use; they introduced an element of variety and freshness into the museum which was of great service in inducing people to repeat their visits. Evening opening had been adopted for some time with great success.

Professor FLOWER dwelt on the great value of Historical Museums in making the past a reality to those of this generation. He spoke in high praise of the way in which specimens were arranged and displayed in the Naples Museum. He also commended the Historical Museums of Holland, most of which had as their aim the illustration of the history of the city in which they were situated. It was, he thought, the duty of all who possessed objects of interest, to hand them over to public museums; failing this, they should at least see that such objects were properly and fully labelled. The neglect of this precaution had led to the loss of many objects of the highest interest and value; for their history, once lost, could very rarely be recovered. Museums, such as those described, did not merely instruct or interest; they raised the moral tone of those who visited them, a result which no mere accumulation of facts could bring about.

Mr. STORRIE spoke of the importance of keeping all historical and archæological finds in the locality in which they occurred. He would wish it made compulsory that all such discoveries should be notified at once to the curator of the nearest museum, and the objects found placed in that museum if possible. He maintained, in opposition to Mr. Paton, that the Ancoats *was* an Art Museum; it dealt entirely with the objects of Art, not of Science, and its function was as much to please as to instruct.

Mr. MADELEY hoped that the work of the Association would, amongst other good results, lead to a full and satisfactory theory of museums. He doubted whether Mr. Paton's sharp division of museums into two classes would stand examination. Neither the giving of pleasure nor the giving instruction was the exclusive aim of any museum; something of both was to be found in all museums. On the whole, he should certainly call the Ancoats Museum an Art Museum.

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Mr. OGLE asked what a curator was to do with "odds and ends," things that did not fit into any recognised department of the museum under his care For instance, the curator of a Natural History Museum might have a few Egyptian antiquities sent him. Should he refuse them, or spoil the unity of the museum by exhibiting them? Or should he put them aside, in the hope that they form the nucleus of a future Egyptian collection?

The PRESIDENT said that all museums, whether Art or Science Museums, brought home to them the importance of studying *things*, rather than words or ideas. He had frequently encountered the difficulty mentioned by Mr. Ogle One plan of meeting many such difficulties, which he had found useful, was the mapping out of the *time* part of a museum. He had adopted the great divisions of (i) *Geological* (closing with Pleistocene); (ii) *Pre-historic;* and (iii) *Historic.* He looked upon the Ancoats Museum as a striking example of the great value of judicious grouping.

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A NOTE ON PICTURE CATALOGUES.

By Butler Wood.

I should like it to be understood at the outset that the few remarks I am about to make on Picture Catalogues apply more especially to those issued by the authorities of our Municipal Galleries, rather than to those of our national institutions. These latter contain large and important collections of pictures, which it is necessary to classify according to schools and periods. This, of course, involves methods of cataloguing different from those applicable to small permanent collections, or to loan exhibitions, such as are usual in the provinces, and therefore it is not proposed to deal with this part of the subject—at least, as far as relates to classification.

The cataloguing of a collection of pictures in a public gallery is not quite so simple a matter as would appear at first sight. The main object, of course, is to give visitors the title of the picture and the name of the artist, and most curators think this is sufficient. But much more than this may be, and is, accomplished; and it is partly with a view of bringing before you a few of the further developments in this direction that this short note is written.

One of the most important advances upon the bare entry of title and artist is the inclusion of explanatory and critical notices of the pictures. In some instances even biographical sketches are appended, where space is no object. This appears to me an admirable plan for dealing with a permanent collection of pictures, such as that of the National Gallery and similar institutions. I have before me a catalogue of the Birmingham Gallery, compiled on this principle, containing a list of artists arranged in

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alphabetical order, many of the entries occupying nearly half a page of quarto size. These notices are full of instruction, and give just the information necessary to the full appreciation of the pictures referred to. But while the plan is suitable for a permanent collection, it is easy to see that it would be unadvisable to treat a loan collection in the same exhaustive manner. It would hardly be worth while, for instance, to give biographical or critical notices of pictures in a temporary Artists' Exhibition, which would probably last no longer than a period of three months. But even in a case of this sort a few lines of amplification would not be out of place in entries of the more important pictures.

Another matter worth mentioning in this connexion is the insertion of an alphabetical list of artists at the end of the catalogue, whether it be of a permanent or a loan collection. The plan, as you are aware, is adopted in the Royal Academy catalogue, and is exceedingly convenient to those who may wish to find any picture by a given artist. I find, in a catalogue recently issued by the authorities of the Mappin Art Gallery, a slight variation in this idea, consisting of the insertion, in the alphabetical index, of short biographical notices of the principal artists, instead of placing the information under the picture entry. In the same manner, an alphabetical list of contributors to the loan collection might be given, to serve the same purpose with regard to the lenders of pictures. This was admirably carried out by the compilers of the Picture Catalogue of the Manchester Jubilee Exhibition, in 1887.

A further variety of the Picture Catalogue includes representations (more or less correct) of the works exhibited. Certainly, if the illustrations are well executed, the book looks prettier for the effort; but beyond this one fails to see any real advantage in such productions, as most pictures lose their effect by being translated into black-and-white. These remarks, however, do not apply to works like Red-

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grave's Catalogue of Water-Colour Drawings at South Kensington—books having a literary value which places them in a different category from those of which we are now speaking. Other minor variations have been indulged in by certain catalogue-makers, but only one of them deserves mention, namely, the inclusion of a plan of the rooms in which the exhibition is held. This is such an obvious advantage to the visitor that one wonders the idea is not more extensively adopted.

Coming to the question of type, paper, and general display, much might be said on these points; but as this resolves itself into a matter of taste, we need only insist on having the catalogue furnished with plain entries, and printed with plain type on good paper. The covers should be as plain and neat as possible, without any attempt at ornamental design, for among the many performances of this kind one rarely finds a designed cover to answer the purpose for which it was intended.

With regard to the cost of printing catalogues, much may be done to reduce it by the judicious insertion of suitable advertisements. By this I mean such as publishers' lists, advertisements of artists' colour men, picture-dealers, frame-makers, and others of like character. In our own case we have an arrangement with a printer, whereby he undertakes to print and sell our catalogues at his own risk, on condition that he be allowed to insert advertisements therein. By this means he is enabled to sell for one penny a catalogue of thirty closely printed octavo pages, exclusive of advertisements, while we, on the other hand, are relieved from all trouble connected with it, except, of course, the furnishing of copy. I can recommend this method of dealing with the printing of a catalogue without hesitation, because it works so satisfactorily to ourselves and the printer who undertakes the work. He is not allowed, however, on any pretence, to interpolate his advertisements with the text; he may place them at both ends if he likes, but nowhere else.

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The size, too, is worth a thought, seeing that the utmost divergence of opinion exists as to what is a handy size of catalogue. We generally find, however, that there is an inverse proportion between the size of the institution and that of its catalogue. That of the Royal Academy is the smallest I know, a chubby 16mo., and altogether a most unpretentious little book, but very convenient nevertheless. On the other hand, 4to. sizes are sometimes used, but they are really too unwieldy for comfortable handling. The size mostly favoured is crown 8vo.; and it seems, on the whole, best suited to general requirements, being neither too clumsy for the hand nor too big for the pocket. Perhaps I may be permitted in this connexion to call attention to the size of catalogue which we have adopted for some of our Branch Libraries at Bradford. It is a size which distinctly refuses to fall in with any existing notation, and therefore must be seen to be believed. It measures $8\frac{1}{2}$ in. by $4\frac{1}{4}$ in., and our readers are so pleased with it that I venture to recommend it to any curator of a daring turn who may be seeking for something new in this direction.

These remarks end my note on catalogues. It is necessary to be practical occasionally, and therefore I hope you will not consider the points brought before you as trivial, or beneath the dignity of discussion. We cannot always be in the clouds, and we are obliged sometimes to leave the contemplation of the works of genius which adorn our galleries and devote our attention to the prosaic work of cataloguing them. I have been designedly brief for two reasons. First, because I do not believe we waste our time by short discussions on practical matter: they often lead to important results. My other reason is that the paper, owing to want of opportunity, had to be short, if given at all, and consequently I made it so.

Mr. HORSFALL commended the size and shape of the Bradford catalogue, both of which he considered very convenient. He advocated the use of guide-books or catalogues of an educational character, giving the ordinary and uninstructed visitor some notion of how to look at a

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picture, and what to expect from it. The great bulk of museum visitors has not advanced beyond the crudest realism, and would, if unaided, simply demand exact reproductions of the external world. This was a state of affairs which the curator of an Art Museum should try to remedy. He also spoke of the work done in this direction at the Ancoats Museum.

Mr. HIGGINS strongly urged the use of simply worded instructive catalogues, which should be sold at a very low price. He specially instanced the success of a little catologue called "Museum Talk," of which thousands of copies had been sold in the Liverpool Museum.

Mr. PLATNAUER expressed himself greatly pleased with Mr. Butler Wood's paper, both from its intrinsic merit and interest, and because it helped, with the papers of the Rev. Canon Hicks and Mr. Horsfall on the previous day, to remove a wide-spread but mistaken impression that this Association was indifferent to Art, and exclusively devoted to Natural Science. He urged the wisdom of putting full detail into picture catalogues, maintaining that people were, as a rule, ill acquainted with most matters relating to Art. He considered that the convenience of visitors would be best consulted by the introduction of biographies into the text, especially where pictures were grouped under the artists who had painted them.

Mr. VIRGO considered portability an important consideration in editing catalogues. He pointed out the practical inconveniences that arose from incorporating biographies in the text of a catalogue, and advocated putting them at the end or in the index.

Mr. HOWARTH also pointed out the difficulties in the way of having biographical notes in the body of the text. He shewed that the grouping of pictures according to their respective painters was often quite impracticable, and that it was in all cases a bar to change and expansion. He added that much practical guidance might be obtained by listening to the remarks of visitors to a museum.

Mr. PATON said that the Bradford catalogue was most convenient, both in shape and size. He considered it impossible to lay down anything but the broadest principles with regard to the compiling of picture catalogues, for different kinds of picture galleries required different kinds of catalogues. Thus a loan collection would require a different sort of catalogue to a permanent one; and the compiler should vary his catalogue according as he had modern or ancient pictures to deal with, or collections containing both. He advocated the frequent introduction of fresh pictures.

The PRESIDENT agreed with Mr. Howarth as to the utility of listening to the comments made by visitors to a museum or Art Gallery, and gave an amusing experience of his own in connection with the subject.

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THE COLOURING OF MUSEUM CASES.

By Edgar R. Waite, F.L.S., Curator, the Museum, Leeds.

THE background of a picture is usually considered to be so important that many artists, whilst entrusting the execution of their principal subjects to some clever student, always lay in the backgrounds themselves.

A similar rule should surely apply to museums; but far too frequently, while the selection, condition, and arrangement of the specimens is carefully attended to, the colouring of the cases is very often entrusted wholly to the ordinary house-painter; or if the colouring is determined by some more responsible person, some particular tint is often chosen simply because it happens to look "nice," and the fact that the background should be carefully selected, with a view to relieving and supporting the Natural History or other objects to the best possible advantage, is too often completely ignored.

Although adapted to suit its special purpose, care should be taken that the colour selected is not in itself obtrusive; and on leaving a museum, no one, other than a curator, should be able to say of what colour were the walls he had just left.

Experience is certainly the best guide in these matters, and as museums are now becoming such wide-spread institutions, it is scarcely necessary to colour various parts of our own walls in a different manner in order to ascertain what particular tint is best suited to relieve our specimens. All we have to do is to visit other museums, and by keeping our object well in view, and by making careful comparison, we shall be able to select some colour which will meet our requirements.

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During my various visits to museums, both here and on the Continent, I have paid some attention to the question of colouring, and having seen almost all tints ranging from white to black, I have, I think, satisfied myself as to what I consider the best colour for *general* museum work.

It will be unnecessary for me to discuss the varied colours used in museums, but it may be interesting to mention the State Museums of London, Vienna, and Berlin.

Dr. Günther considers that pale blue is the best colour to use, and consequently the cases at South Kensington are of this tint.

I was extremely surprised on entering the magnificent K.K. Naturhistorische Hofmuseum of the Austrian capital, opened only three years ago, to find nearly all the cases painted black. To me it appeared to produce such a ponderous and heavy effect, that I could not imagine why such a colour had been used in what I should otherwise consider to be one of the most magnificent and generally complete museums I was ever inside.

I have been in several museums in which the colouring has been in a dark key, but never before in one where absolute black was used. True, all the cases were not black, but these, being of a very dark maroon, I thought to be quite as objectionable, if not even more so.

The difference between the Austrian Museum and the "Museum für Naturkunde der Königlichen Friedrich-Wilhelms-Universität" in Berlin was very striking. Here everything appeared to be light and cheerful—a by no means secondary consideration, for museums are popularly held to be somewhat dismal places, and no wonder.

The whole of the inside of the cases, together with the fittings and stands upon which the objects are mounted, is a uniform drab, stone, or buff colour. This is very pleasing to the eye, is light, but quite unobtrusive, and relieves the specimens better than any other colour I have seen applied to museums.

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The director of the Zoological collection, Dr. R. Möbius, pointed out to me that the cases were not painted, but lined with a material which I believe to be "American cloth," of which he gave me a small portion (exhibited).

I have not compared the cost with colouring, but, although the initial expense must necessarily be greater, as the material is practically imperishable it would be cheaper in the long run. It does not give off particles in the form of dust, as is the case with distempering, and having a smooth surface it does not retain the dust which may (unless we have adopted Mr. Teale's principle, *vide* page 81), settle upon it. If, however, it should become somewhat dirty, a little soap and water, applied with a sponge, will set the matter right again.

Mr. PATON thought that the colouring of the back-ground of cases was, to a great extent, a matter of taste; no rule could be given, but general principles might be stated. He had not felt the dismal effect said to be produced by the sombre colour of the cases in the Vienna Museum. The general effect that he had carried away from that museum was, that both cases and fittings were very good, and the extensive use of iron gave an appearance of great lightness. Every positive colour should be looked upon as a positive mistake; negative colours are the best for general use. A light drab, similar to that exhibited, he considered a very safe colour. Mr. Paton then gave a short description of the card-board back used at the Berlin Museum.

Mr. MADELEY objected to dark back-grounds, not from any bad effect on the appearance of the specimens, but because of the waste of light that they occasioned. The light blue colour, so largely used at the British (Natural History) Museum, is very objectionable; it spoils the effect of the specimens, and its glare is very disagreeable to the eye. This colour has been replaced at Warrington Museum by cream-colour, and with very good results. Where specimens are in a matrix, a very good effect is often obtained by making the back-ground of the same colour as the matrix. The effect of judicious choice of colour in a back-ground was well illustrated by the case of Woodpeckers, set up by Professor Flower, in the Bird Gallery at the British Museum (Natural History).

Mr. STORRIE referring to the specimen of American cloth exhibited, said that great caution was necessary in choosing such materials for the back-

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ground of cases. He had himself seen an instance where a beautiful collection of old silver had been completely tarnished by the sulphur in the oilcloth lining the case containing it.

Professor BOYD DAWKINS said that many experiments on this subject had been tried at the Owens College. Blue had been definitely abandoned, one great objection to it being its want of permanence. Buff was the colour generally adopted in the museum; but he pointed out that it was neither possible nor desirable to insist on one colour or shade. Sometimes harmony between the colour of the back-ground and specimen was advisable; at others, contrast was preferable. He had found that in many cases a tray of common sea-sand formed an excellent back-ground, especially for shells. Its colour was unobtrusive, and its being variegated enabled it to serve for a wide range of objects.

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MUSEUM NOTES.

I.—ON A MODE OF ILLUSTRATING THE LIFE-HISTORIES OF THE BRITISH LEPIDOPTERA.

By J. W. Carr, M.A., F.G.S., University College, Nottingham.

IF we go into almost any British Museum of Natural History and ask to see the collection of British Lepidoptera, we are shown a cabinet whose drawers are filled with a more or less complete collection of the Imagines, or adult forms of this group of insects. Interesting and valuable as such a collection undoubtedly is, it yet leaves much to be desired, inasmuch as we still remain completely ignorant of the habits and life-history, and are told nothing of the earlier stages in that wonderful series of metamorphoses through which every species passes before attaining the adult form.

Nor is it only to the scientific observer that such information is valuable; in agricultural districts it becomes a matter of the greatest importance to have some knowledge of the various stages in the life-history of insects which are injurious to crops. In order to impart such knowledge, it will be necessary to supplement the ordinary museum collection by the addition of preserved specimens of the ova, larvæ, and pupæ of at least the more important species. Obviously in most museums the system could not be extended to the whole of the British species of Lepidoptera, as considerations of space, cost, and labour, as well as the rarity of many species, would preclude this being done. Many museums would have to be contented with merely illustrating the life-histories of those species which are harmful from the agricultural point of view; others might extend it to family-groups, or perhaps to genera, and even to the principal species.

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The best method of exhibiting such life-history groups will depend upon local conditions of space, expense, &c., and must be left to the judgment of the authorities of the individual museums. It may, however, be of interest if I briefly describe the method which I have adopted in the Nottingham Museum. As will be seen from the specimens on the table, each specific group is contained in a box, measuring 11 by 8¼ by 2¼ inches (inside measurement), made of very stout millboard, lined with cork at the bottom, and having a glass front and top. In the box are placed actual specimens of the ova, larvæ, pupæ (together with the cocoon when there is one), and both sexes of the imago of the species of Butterfly or Moth, whose life-history we wish to illustrate. The larvæ are placed on their usual food-plant, and the ichneumonideous or other parasites, by which larvæ are so often infested, are also shown.

It is unnecessary here to enter into details concerning the mode of preservation of the specimens, as full particulars are given in several Entomological works, as *e.g.*, Greene's "Insect Hunter's Companion" (Sonnenschein, 1/-). Some little practice is required in modelling the plants before very satisfactory results can be attained. The leaves are cut out of thin sheets of green waxed linen, and affixed to stems made of soft wire, covered with wax. The "phyllotaxis," or mode of arrangement of the leaves on the stem, must be copied from a branch of the actual plant.

I do not, of course, contend that these life-history groups should replace the usual museum collection of Lepidoptera, in which the Imagines alone are represented. I would, in all cases, make the groups supplementary to such a collection. Moreover, although I have so far restricted each box to a single species, there is no reason why two or more species—especially when of small size, and when the food-plant of the larvæ is the same—should not be placed in the same box, and so economise space.

Any details concerning the mode of preparation or

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preservation of specimens, nature, origin, or cost of materials used, I shall be very glad to furnish to anyone desiring such information.

A list of the firms from whom the materials can be obtained may be useful:—The *Boxes* are made by Messrs. A. KENT and SON, Clarence Works, Clarence Street, Clapham, London, S.W. Mr. J. H. MINTORN, of 15, Soho Square, London, supplies the *Waxed Linen*, in all tints, *Wire*, *&c.*, and also the *Leaves* of a great number of plants, ready made. The *Insects*, in all stages of their development, may be obtained from any of the numerous Entomological dealers; but it is much more interesting to rear them one's self, as is done in the Nottingham Museum, where the Insect Vivaria are a source of great interest to the general public.

II.—NOTES ON A BOTANICAL MUSEUM.

[As a considerable part of this Paper, as originally written, was of a similar character to that read on the same day by Professor Weiss, it is now published in abstract.—J. W. C.]

THE functions and machinery of a Botanical Museum having been exhaustively and admirably described by Professor Weiss, in his paper on "The Organization of a Botanical Museum," I shall, in this short paper, only endeavour to supplement that by Professor Weiss with a few remarks which may be of some practical value to those engaged in museum work. In forming a Botanical Museum, many specimens have to be dealt with which are of such a nature as to render it inconvenient or impossible to associate them with the ordinary herbarium specimens of dried plants, which are usually mounted on sheets of paper. Such specimens, for example, as most Fungi; fruits of a succulent nature; dissections of various organs; morphological structures, such

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as tendrils, spines, pitchers, &c.; adaptations for special modes of life, such as parasitism, and for dispersal of fruits and seeds; preparations illustrating the germination of seeds, &c., obviously cannot be adequately illustrated by dried specimens, but may be well represented by specimens preserved in spirit in glass jars, preferably of rectangular shape. Slender and collapsible specimens may be fastened with a needle and thread on to thin sheets of colourless mica, while bulky or solid specimens may be suspended in the spirit by means of small globular glass floats. The only objection to preservation in alcohol—an objection which, so far as I am aware, has not been overcome—is that the green and most other colouring matters are extracted by it, and the preparation often presents an unsightly appearance owing to the tannin, which is not dissolved by the spirit, and which leaves the specimen of a dirty brown colour. The latter difficulty may be overcome by previously placing the specimen for some time in alcohol containing two per cent. of hydrochloric acid; this completely bleaches the object by removing the tannin, as well as the other colouring matters. The jars containing the specimens are closed up by sealing the covering glass with a cement, composed of three parts by weight of gutta percha and two of asphalte. In preparing this cement, the asphalte must first be very gradually melted, and the gutta percha added in small pieces—a few at a time—the whole being well stirred at frequent intervals. It must be put on hot, most conveniently with a small knife, which, as well as the cover-glass, should first be made warm. A small weight should be placed on the top of the jar until the cement is set hard. In the cover-glass a small hole is drilled, through which, if any evaporation should take place, fresh spirit may occasionally be added by means of a pipette; the hole being then closed with a small disc of bladder or other impervious material. The jars should be arranged on shelves in wall cases, against a coloured background; or, if preferred, the specimen in each jar may be fastened on to a thin sheet

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of opaque glass; white or black is best, according to the character of the preparation.

The Rectangular Glass Jars are to be had of Messrs. POWELL and SONS, Whitefriars Glass Works, Temple Street, Fleet Street, London; or of Messrs. GUNLACH and MULLER, Ottensen bei Hamburg. The Glass Floats can be obtained from Messrs. TOWNSON and MERCER, 89, Bishopsgate Street Within, London.

Mr. PLATNAUER objected to the stopping of the hole in the plate closing bottles containing spirit preparations, on the score that the hole would cease to act as a safety valve for the vapour of the enclosed spirit. He also asked Mr. Carr to give all possible details with regard to the materials used in his preparations.

Mr. HIGGINS highly commended the life-history groups of Lepidoptera exhibited by Mr. Carr. The artificial leaves he considered most useful, from their fidelity to Nature and their great durability. He would strongly urge upon curators not to hesitate to devote space to the exhibition of such groups.

Mr. PATON considered that practical papers, such as those just read, illustrated by the exhibition of preparations, were the best possible tribute to the usefulness of the Association. Specimens such as those exhibited were invaluable for rousing public interest in Natural Science. He expressed a hope that several series of such groups might be prepared for museums under the supervision of Mr. Carr.

Mr. STEWART said that the utility of these groups might be further increased if small maps, showing the distribution of the species exhibited, were put in the cases.

Mr. MADELEY agreed with Mr. Paton in wishing that several series might be produced, and considered that this was an instance in which co-operation amongst museums might be productive of much practical good. With regard to bottles containing spirit preparations, he thought that, unless the vent-hole was stopped, there was danger of the spirit overflowing.

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The PRESIDENT considered picturesque groups invaluable for arousing interest in Natural History. He considered that before attempting to reform the public the curators should reform themselves, and aim at making the objects they exhibit really attractive. If this were done, there need be little fear but that the public would take interest in museums, and in the subjects they illustrated. He maintained that it was quite possible to make the objects exhibited in museums beautiful, without in the least diminishing their educational value.

Mr. HORSFALL exhibited some excellent chromo-lithographs of trees, flowers, and Fungi, and strongly advocated their use in all cases where dried specimens gave an inadequate notion of the object to be represented.

Mr. VERGO said that an exhibition of specimens and appliances treated of in the papers read, would be a useful feature in future meetings.

Mr. STORRIE objected to the artificial leaves used in the setting up of the Lepidopterous groups. He considered them stiff and unnatural, and thought that it would be better to use twigs and leaves of the plant, which, he said could be preserved by being dipped in melted paraffin.

Mr. CASE stated that he had been led to adopt the life-history groups he had exhibited from the interest displayed in the insect vivaria used in the Nottingham Museum. They possessed the great advantage, over vivaria, of exhibiting the phenomena of insect metamorphosis permanently. He then proceeded to describe the method of inflating the skins of the larvæ (from which the viscera had been pressed out) by the injection of warm air. Artificial leaves had been adopted on account of repeated failures in keeping natural ones unfaded. With regard to the question of stopping the holes in the lids of glass jars containing spirit, he found that the paper *did* answer as a safety valve, either from its being sufficiently porous, or sufficiently elastic, or both. With regard to herbaria, he had kept dried plants in the dampest part of the museum, and in both cases without any results.

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DUST IN MUSEUM CASES: HOW TO BATTLE WITH IT.

By T. Pridgin Teale, M.A., Oxon., F.R.S.

BUT few successful attempts have been made to exclude dust from museum cases, and for this reason—that people have not asked themselves the question,

How does Dust get in?

If dust is to be kept out of any cavity, we must first find out why the dust gets in, in spite of good workmanship and accurate fitting. The reason is simple, ridiculously simple, when stated; but, curiously, it has been little, if at all, thought of, and certainly hardly ever acted upon in practice. And the reason is this. Closets, cupboards, drawers, and boxes contain air; if the air were inelastic, and never altered in volume, there would practically be no entrance of dust into these closed cavities. Unfortunately for our cleanliness, air is changing in volume incessantly. We are all familiar with the barometer, and most of us, no doubt, understand why the quicksilver rises and falls in the glass tube, or why, in the aneroid barometer, the index moves to right or left. Let us consider what these changes mean, and what they record.

When the air around us becomes condensed—shrinks into a smaller volume—it becomes heavier, puts greater pressure on the surface of the mercury, and makes it ascend in the tube; then the mercury is said to rise. When the air expands—swells into a larger volume—it becomes lighter,

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the pressure on the mercury is less, the mercury sinks in the tube, and the barometer is said to fall. Therefore, every change of height of the quicksilver which we observe is a sign and measure of a change in the volume of air around us. Further, this change in volume tells no less upon the air inside our cases and cupboards. When the barometer falls, the air around expands into a larger volume, and the air inside the cupboard also expands and forces itself out at every minute crevice. When the barometer rises again, the air inside the cupboard, as well as outside, condenses and shrinks, and air is forced back into the cupboard to equalise the pressure; and, along with the air, in goes the dust. The smaller the crevice, the stronger the jet of air; the farther goes the dirt. Witness the dirt-tracks so often seen in imperfectly framed engravings or photographs. Remember, ladies and gentlemen, whenever you see the barometer rising, that an additional charge of dust is entering your cupboards and drawers. So much for the barometer, which is a very restless creature, rarely stationary for many hours together.

But this is not all. We also have the thermometer. The temperature of our rooms varies daily—often considerably—between mid-day and midnight, and greatly between summer and winter. What does the thermometer tell us? Not less than the barometer does it tell of change of volume of the air, though it is probably not so rapid in its effect upon the air in enclosed spaces as is the change of volume indicated by the barometer. As temperature rises outside our cases, the increased warmth is slowly conducted to the air inside the case, which expands and escapes through the crevices. Then, when the time for cooling comes, the air inside slowly contracts, and back rushes the air through the crevices, and again in goes the dust. Thus we see we have two factors constantly acting, one or other tending to produce daily, nay, hourly changes in volume of our dirt-carrying air.

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In order to inform myself of the amount of change of volume that could, under extreme conditions, possibly take place, I asked Professor Rücker to kindly calculate for me the change of volume that would take place in 100 cubic feet of air, between a temperature of 30 degrees, *i.e.*, just above freezing-point, in combination with the barometer standing at 30 inches, or about "fair," and a temperature of 60 degrees, combined with the barometer standing at 29 inches, or "stormy." He told me that the difference would be about 10 cubic feet, or one-tenth; in other words, that a closed case of 100 cubic feet, if hermetically sealed at a temperature of 30 degrees, with the barometer standing at 30 inches, would have to resist the pressure equivalent to the addition of 10 cubic feet, when the temperature rose to 60 degrees, and the barometer fell to 29 inches.

Have we not now discovered the reason why dirt enters closed spaces? What shall be the remedy?

Seeing, then, that air will find an entrance, and in the nature of things must get in, we must let it in, not at innumerable uncovenanted small crevices, but at our own selected opening, specially provided. Then we are in a position to strain off the dust by providing the selected opening with a screen, which acts as a filter. These, then, are the general principles on which we must act. The rest is a question of detail. The details range themselves under three heads:—1. What is the most effective, or the most generally applicable filtering material? 2. Given the filtering material, what ought to be the proportion between the area of the screened opening and the cubic contents of the case to which it has to be fitted? 3. What, in any particular instance, is the best situation for the filter?

A.—Filtering Material.

What is needed in our filtering material is that it shall readily allow air to pass through, and shall also possess the quality of arresting in its meshes fine particles of dust.

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Having tried coarse canvas, bunting, flannel, cotton demette, and cotton wool, I have found the two latter to be the most effective, namely, cotton wool and cotton demette, which combines an open texture with a very soft woolly surface.

B.—The Proportion between the Filtering Opening and the Cubic Contents.

This is a question which experience alone can decide. Doubtless, the larger the area of screened opening, the more effective the filtration. For a book-case with glazed front, probably the whole of the back might be made of flannel, loosely fixed over the necessary skeleton framework. For a cupboard or closet, every panel should be replaced by a screen. If the closet have a window, all crevices and joints in the window should be pasted up to exclude the soot, otherwise the wind from the outside, or the fires of the house from the inside, will force the air and soot through. On the other hand, it is probably true that, given very perfect fitting and workmanship, aided by the interposition of velvet, as hereafter described, where the edges of the doors come into contact with their frame, a much smaller area of filter, perhaps even a simple tube filled with cotton wool, may prove to be efficient. These, however, are points on which further experience is needed, and which may, ere long, be settled by experiment.

C.—The Situation of the Screened Opening.

Where shall we place our screen? This is a question which admits of a variety of answers, and gives scope for endless ingenuity. In anything which is being newly made, such as the cupboards and closets of a new house, or in new furniture, we are masters of the situation. In many of them we may substitute at the back our filtering texture for wooden boards, and perhaps even save expense thereby. In closets we may replace the panels of the door by filtering texture, guarding the closets, if necessary, against thieves

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by wire netting or iron bars fixed on the inner side. As a rule, chests of drawers may have the filter over the whole surface at the back, care being taken that the back of each drawer falls half an inch short of the top of the drawer, to allow free entrance of air from the screen. In one set of drawers, so placed that I could not get at the back, the difficulty was got over in this way:—In the front of each drawer a series of twenty holes, of an inch diameter, was made for admission of air. The filter, on a frame, was fixed on the inner surface of the front of the drawer, so that the material should stand half an inch away from the holes. A somewhat similar plan was adopted in a bureau. About twenty large holes, two inches in diameter, were cut in the woodwork at the back, some of the holes being opposite pigeon-holes. Then the whole was covered with bunting, on a frame so arranged that the bunting was fully half or two-thirds of an inch away from the wood.

Another method has been adopted with considerable success, by Professor Miall, at the Yorkshire College. A large rectangular hole is cut into the top of each case. This is covered by a movable frame, covered with demette. This, again, is covered by an angular roof, with the front face vertical, like a weaving shed roof, filled with demette. Thus the opening for admission of air is on the top of the case, and is guarded by a double filter. The fitting of the doors is of the ordinary workmanship of fancy goods cases. Professor Miall is certain that the result obtained is well worth the trouble taken to accomplish it.

Mr. Branson, of Messrs. Reynolds and Branson, of Leeds, has tried, with very good effect, a somewhat similar arrangement for cases containing scientific instruments.

How to Deal with Crevices.

What shall we do with crevices and cracks? At first, I hoped that narrow chinks might be ignored, on the principle that easy passages of air through an ample screen would

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virtually stop off currents through narrow spaces. In this I have been disappointed, as, in some cases, a chink, though apparently narrow, has proved too accommodating to the passage of air, and a more ready channel than the interstices of flannel. My rule now would be to close or guard with filtering material every place where the door comes into contact with its frame.

The plan I have adopted with the doors of several cupboards and closets is this—to put strips of cotton velvet wherever the door comes into contact with its framework. On the side where the hinges are, the velvet is glued and sprigged to the edge of the door; on the other side and the top the velvet is fixed to the rebate against which the door presses. If the door belong to a closet, and the bottom is not in close contact with the floor, a small piece of flannel or cloth may be fixed along the inner side of the bottom of the door, so as to form a curtain which closes the gap, and filters any air that passes through.

Such, then, are the principles which may guide us to a victory over dust, and such are some of the details whereby we may work out a method by which it is to be won. Few persons have more direct interest in the question than curators of museums. I trust that I have said enough to convince them that the way is open to victory, and to inspire them with a determination to fight and win.

[At the Sheffield Museum a chamber for the equalisation of atmospheric pressure has been placed in all wall cases made during the past five years. This chamber is beneath the floor, there being a rectangular opening in the floor of the case and one in the plinth, the chambered space between being filled with cotton wool, and the openings covered with a fine wire gauze. The openings are from four to eight feet apart, the greater distance being adopted in the later cases.—E. HOWARTH.]

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LIBRARY AND MUSEUM LEGISLATION.

By E. Howarth, F.R.A.S.

AT the last Annual Meeting of the Association I called attention to a Bill that was then before Parliament, and has since become law, entitled, "The Museums and Gymnasiums Bill." The main features of this Act are given in the Report of Proceedings for 1891.

During the session of Parliament of 1892, a Bill promoted by the Library Association, and entitled, "The Public Libraries Law Consolidation Bill," has been passed. This Act does not aim at any material alteration of the law as it affects Libraries and Museums, but rather serves to bring into one consolidated Act the numerous general Acts that have from time to time been passed, without in any way affecting the private Acts that have been obtained for particular towns. It may not be out of place to give here the general features of this Consolidation Act.

Clause 1 extends the Act to every Library District for which it is adopted.

Clause 2 retains the limited rate of one penny in the pound for the purposes of the Act.

Clause 3 provides for a vote of the ratepayers being taken before the Act can be adopted; and it also appears to make it necessary to take a vote to fix the amount of the rate, which cannot be more than a penny in the pound.

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Clause 4 vests the carrying out of the Act, after its adoption, with the Urban Sanitary Authority in the case of an Urban Sanitary District, and with Commissioners in the case of a parish.

Clauses 5 and 6 relate to the appointment of Commissioners to carry out the Act in a parish.

Clause 7 states that the Commissioners shall meet at least once a month.

Clause 8 relates to the entering of the proceedings of Commissioners.

Clauses 9 and 10 give powers to two parishes to carry out the Act conjointly.

Clause 11 gives power to establish Libraries, Museums, Art Galleries, and Schools of Art, to which the public shall be admitted free of charge.

Clause 12 relates to the acquisition of land for the purposes of the Act.

Clause 13 relates to the acquisition of land from persons holding such for ecclesiastical, parochial, or charitable purposes; and any such land conveyed to a Library Authority shall not exceed one acre.

Clause 14 vests all land in the Library Authority.

Clause 15 gives the Library Authority power to buy books, specimens of Art and Science, etc., and to appoint salaried officers; and the Library Authority may delegate these powers to a committee, the members of which need not be members of the Sanitary Authority.

Clause 16 incorporates the provisions of the "Companies Clauses Consolidation Act" with respect to the accountability of officers.

Clause 17 relates to the division of cost, etc., where two or more parishes join in carrying out the Act.

Clause 18 authorises the acceptance of grants for buildings out of money provided by Parliament.

Clause 19 relates to the levying of the rate.

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Clause 20 relates to borrowing powers.

Clause 21 stipulates that separate accounts shall be kept.

Clauses 22, 23, and 24 relate to the adoption of the Act in the City of London, and stipulate that the rate shall not be limited to a penny in the pound in the case of London.

Clauses 25 and 26 are defining clauses.

Clause 27 repeals the Acts in the Second Schedule.

Clause 28 states that the Act shall come into operation on January 1, 1893.

Clause 29. This Act may be cited as "The Public Libraries Act, 1892."

There are two Schedules to the Act, the first of which gives the regulations for ascertaining the opinion of voters in a Library District; and it is not necessary to give these, though the form of voting paper is interesting, and may be given:—

FORM OF VOTING PAPER.

QUESTION 1.—Are you in favour of the adoption of "The Public Libraries Act, 1892"?

QUESTION 2.—Are you in favour of the rate being limited to one halfpenny in the pound? (*or* to three farthings; *or* of the existing limitation of the rate under "The Public Libraries Act, 1892," being removed; *or* of the existing limitation to one halfpenny being raised to three farthings, as the case may require)?

The Second Schedule is as follows:—

ACTS REPEALED.

SESSION AND CHAPTER.	SHORT TITLE.
18 and 19 Vict., c. 70	"The Public Libraries Act, 1855."
29 and 30 Vict., c. 114	"The Public Libraries Amendment Act (England and Scotland), 1866."
34 and 35 Vict., c. 71	"The Public Libraries Act (1855) Amendment Act, 1871."

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47 and 48 Vict., c. 37—"The Public Libraries Act, 1884."

50 and 51 Vict., c. 22—"The Public Libraries Acts Amendment Act, 1887."

52 and 53 Vict., c. 9—"The Public Libraries Acts Amendment Act, 1889."

53 and 54 Vict., c. 68—"The Public Libraries Acts Amendment Act, 1890."

From this brief summary of the Act it will be seen that no attempt whatever has been made to improve Library and Museum legislation; but it has served to bring to a focus all the evils and impeding restrictions that a beneficent Legislature has thought fit to place on such institutions of learning and progress as we are associated with. This may serve to make more enlightened future legislation easier of attainment; and probably the Library Association, in promoting this Bill, had such object in view. There are, however, one or two matters in the Act that are not simply a renewal of the old law, and one of these appears to me to be so important as to deserve special notice. I refer to the power given to the voters to say whether the rate shall be a halfpenny or three farthings; and if they fix it at a halfpenny, another vote must be taken before it can be increased. So far as I know, this differs from previous Acts, and appears to me to be a great mistake. It must be quite obvious that those who have to administer the Act know best what rate will be required, and to tie their hands beforehand is manifestly unfair. After saying they cannot levy more than a penny it is hardly necessary to say how much less they must levy. In answering the first question on the voting paper the voters may have various motives. One may wish for an Art Gallery, another a Museum, another a School of Art, and another a Library, and each one may object to the establishment of any other institution than the one he wishes to have. Thus he may only vote for a rate that will be sufficient to meet the requirements of one institution.

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Another point is limiting the quantity of land to an acre. In a large town this is hardly sufficient for Library, Museum, Art Gallery, and School of Art.

Altogether this legislation is restricting in its character, and does not at all tend to foster the growth and development of institutions it is intended to establish. It is almost impossible, in the face of other legislation relating to municipal and county government, to imagine why it should be necessary to take a vote of the ratepayers before a Museum or Library can be established. No such unwieldy and unsatisfactory process is necessary if a town wishes to establish baths or gymnasium, or to acquire a park, or do any other reasonable thing conducive to the well-being of the people.

Different towns give, I dare say, different experience, but so far as my own is concerned there is nothing the people more willingly support than institutions which contribute to their intellectual enjoyment and moral improvement, such as Art Galleries, Libraries, Museums, &c.; and with Town and County Councils and other governing bodies elected directly by the ratepayers, it would be only reasonable to leave to these corporate bodies the power to carry out the legitimate requirements of the people with regard to Libraries and Museums, without any question of limitation of rate or special vote. Besides, the principle of leaving these matters in the hands of corporate bodies has long since been conceded by Parliament. There are probably more than a score of towns that have obtained Parliamentary sanction to levy rates beyond a penny in the pound for Museum and Library purposes. In most cases this power has been obtained because the penny rate was found to be insufficient, though in one, at least, it was obtained without any such experienced need. I refer to the town of Oldham, which adopted the logical course of asking for power to establish and maintain Libraries and Museums and Art Galleries, without any reference to a rate at all. And they

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got the power. In "The Museums and Gymnasiums Act" of last year the Urban Authority can establish such without any vote of the ratepayers. It is rather interesting to contrast this Act with the Consolidation Act of this year. The former consists of fifteen clauses, and occupies not quite five octavo pages of print. The latter contains twenty-nine clauses, and occupies, with the Schedules, sixteen folio pages of print. "The Museums and Gymnasiums Act" concerns itself with giving powers for the establishment of Museums and Gymnasiums in accordance with the requirements of the day, and does not incorporate needless restrictions and impedimenta to carrying on the work. As a slight example of the efficacy of the two Bills, apart altogether from the leading principles previously referred to, it may be mentioned that under "The Libraries and Museums Act" there is no power to remove from a Museum, Art Gallery, or Library any person who wilfully breaks the regulations, and any official ejecting such a person, unless he had committed a breach of common law, would be liable to be summoned for an assault. "The Museums and Gymnasiums Act" gives the power to maintain the regulations.

It seems to me that the time has now arrived, both by practice and precedent, for legislation on more enlightened lines, and lines more accordant with present day wants and feelings, than has been the case in the past; and I would strongly recommend that the Museums Association and the Library Association should co-operate in bringing about this improved legislation.

The following letter from Mr. MacAlister, the Hon. Sec. of the Library Association, was read by Mr. PACY:—

"LIBRARY ASSOCIATION OF THE UNITED KINGDOM,
"20, HANOVER SQUARE, W.,
"July 5th, 1892

"In the columns of the *Athenæum* I publicly invited the Museums Association to co-operate to make suggestions. Although we have every reason to congratulate ourselves on the success of our first venture in

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legislation, still there is no reason why we should sit down and fold our hands. I have always regarded our Consolidation Bill as a first step to more important amendments of considerable importance to the working of the Acts. There are yet several large principles which we can only hope to carry by "pegging away" at the public and at Parliament. My views of the position of the delegates to the Manchester Meeting is this: that they should courteously receive any proposals on the part of the Museums Association on behalf of this, making such comments and suggestions as they think fit, and generally express cordial willingness to co-operate with the sister Association in any effort to secure a better law. The proposals of the Museums Association should be embodied in a report by the delegates, and be discussed at our own Annual Meeting."

Mr. PACY, one of the delegates from the Library Association, then proceeded to discuss "The Libraries and Museums Consolidation Act," and the criticisms that had been made on it. He pointed out that Sir John Lubbock's aim had been to procure simple consolidation for the sake of convenience, rather than any change in existing legislation on the subject. Several of Mr. Howarth's proposals had been brought forward by the Library Association and rejected by the Select Committee. The Act did not represent all that the Library Association desired, but only all they could obtain. Any attempt to have insisted on further concession would have wrecked the Bill. Libraries, unlike Museums, could only be undertaken by Local Authorities after the consent of the ratepayers had been obtained. He could not see his way to any general scheme for abolishing the present restriction of the rate to one penny. In many cases Town Councils had obtained the consent of the ratepayers on the distinct understanding that no more than a penny rate was to be levied, and to raise more would in such cases be a breach of faith. Further than this, the removal of the limitation would deter many towns which at present had no Free Libraries from adopting the Act. He was of opinion that the limitation had better remain, and that Town Councils desirous of exceeding the penny rate should obtain special Acts empowering them to do so. The Library Association, he added, would gladly welcome the co-operation of the Museums Association in procuring improvements in legislation.

Lieut.-Col. TURNER mentioned an experience of his own in Stockport, which he considered might be useful. The new Act was in force in Stockport, both with regard to Museum and Library; but the authorities, before handing over the amount derived from the rate to the committee, deducted from it the expenses of levying. Against this he had successfully protested, and the consequence was that the full amount of the rate was now devoted to Library and Museum purposes. He would advise all concerned with Museums or Libraries to make sure that the amount to which they were nominally entitled was paid in full.

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Mr. OGLE dwelt upon the caution and tact necessary in trying to get even the most obviously just and necessary legislative changes. They had been advised by men experienced in Parliamentary procedure to move amendments in Committee in preference to embodying their proposals in the text of the Bill. The Act certainly had defects, but it gave some decided advantages. It allowed of the hire of a building, of the letting of unused parts of Library or Museum premises, and extended the power of union among parishes. The members of the Library Association were, for the most part, quite agreed that Town Councils ought to be able to erect and endow Libraries without immediately consulting the ratepayers, and that the limitation of the rate was unfortunate and unnecessary. But many of them thought it impolitic to attempt to alter the present restrictions. It was, at least, an open question whether the removal of the rate limitation would not seriously check the adoption of the Act. He was further of opinion that separate rates should be levied where both a Library and a Museum were to be maintained, so as to prevent either from being fostered at the expense of the other.

The PRESIDENT entirely agreed with Mr. Howarth's contentions. It was quite unreasonable that Town Councils should be denied, in the case of Libraries and Museums, the liberty of action accorded them in every other department of their work. The public needs and the public means should in all cases determine the limits to be observed. He observed, too, that the limitation of rate did not apply to the City of London, and he could not understand why it should be unjust there and just in other parts of the kingdom. He entirely dissented from the notion that there would be any unfairness or breach of faith in the removal of the penny limit. It must always be remembered that Acts of Parliament are made to meet existing circumstances; we must not expect them to last for all time. No legislation is worth anything unless it can be adapted or altered to meet with the changing requirements of the community.

Mr. HORSFALL fully agreed with the President. The limitations referred to were introduced in times of great general ignorance, and were then wise and necessary. But in these times of greater knowledge they were no longer useful, and were even obstructive. The time had come for their removal.

Mr. MADELEY said that it seemed to him there was unnecessary anxiety to consult the ratepayers. The Act of 1845 does not mention any appeal to ratepayers. This appeal was really introduced not as a check upon the action of Town Councils, but on the contrary, to enable the general body of ratepayers to take the initiative in cases where the

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Town Council delayed to take advantage of the Act. So many towns had now taken power to exceed the penny rate that such action could no longer be considered unfair. One grave practical objection to a rate limitation was the difference in the rateable values in different boroughs. A rate that amply sufficed in one town might be quite inadequate in another. For instance, the penny rate in Bootle produced a sum nearly three times as great as that raised by the same rate in Warrington, notwithstanding that Warrington had the larger population of the two. The only way of removing this difficulty was to do away with the limitation.

Mr. Councillor LYON said he would urge upon all Town Councils the wisdom of taking the public into their confidence in such matters. The question was one of public interest, and he felt sure that the mass of the ratepayers would in all cases loyally second the efforts of their representatives for the public good.

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A CATALOGUE

OF THE

TYPES AND FIGURED SPECIMENS

CONTAINED IN THE

GEOLOGICAL DEPARTMENT

OF THE

MANCHESTER MUSEUM, OWENS COLLEGE.

By Herbert Bolton, Assistant Keeper in the Manchester Museum.

AMONGST the many fossils which a museum may possess, those which have the distinction of being the first described of their kind are the most valuable. Serving, as they do, as types or standards of genera and species, their precise whereabouts cannot be too well known.

With the object of extending this knowledge, I desire to lay before you a short account of type and figured specimens in the possession of the Manchester Museum.

The present Geological Section of this museum has been mainly formed by the fusion of the following collections:—

Bowman Collection.—A collection of Silurian and Coal Measure fossils. Acquired by gift by the Manchester Geological Society in 1842, and transferred to the Museum in 1864.

Bird Collection.—A general collection of fossils and minerals, containing many excellently preserved specimens. Acquired by purchase, 1883.

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Cumberland Collection.—A collection of Crinoids, from the Carboniferous Limestone of Bristol and neighbourhood, and also of Apiocrinus from the Bradford Clay. Amongst the latter are the originals of the figures in Cumberland's "Reliquiæ Conservatæ." Acquired by purchase by the Manchester Geological Society, in 1842, and transferred to the Museum in 1864.

Darbishire Collection.—A general collection of fossils of all formations, presented over a period of years, from 1875 onwards.

Boyd Dawkins Collection.—A large collection of fossils from all formations, and including the major part of the Vertebrate and other remains obtained by Professor Dawkins from caves and fissures of Pleistocene Age. Acquired by gift, 1889.

Edwards Collection.—A large collection of fish and other remains, from the Old Red Sandstone of Caithness. Acquired by purchase, 1891.

Finlay Collection.—A large series of Neolithic Implements from Greece and the Greek Isles. Acquired by gift, 1877.

Forbes Collection.—The collection of the late Professor David Forbes, consisting of fossils, minerals, and rock-specimens. Acquired by purchase, 1877.

Franks Collection.—A large series of Neolithic Implements from Scandinavia. Acquired by gift, 1877.

Gibson Collection.—This consists of fossils from the Yoredale Shales, and Millstone Grit Series of the Vale of Todmorden, Yorkshire. Most of the specimens are types of the genera and species described by the late Captain T. Brown. Some of the species described by him have not yet been traced. A few specimens bear MS. names. Acquired by gift by the Manchester Geological Society, in 1843, and transferred to the Museum in 1864.

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Homfray Collection.—A small collection of Cambrian fossils, many of which are types described by Salter and Hicks. Acquired by gift, 1875.

Lightbody Collection.—A magnificent collection of fossils from the Cambrian and Silurian formations, containing types described and figured by Salter, Woodward, Blake, and others. Acquired by gift, 1875.

Roeder Collection.—A general collection of fossils and prehistoric remains, including a very complete series of fossils from the Permian Marls of Manchester and the Zechstein of Gera, Thüringen. Acquired by gift, 1890-91.

Thompson Collection.—A collection of Neolithic Implements and remains from the Lakes of Brienne, Switzerland. Acquired by gift at various times.

Toulmin Smith Collection.—A collection of sponges from the Upper Greensand and Chalk. Acquired by gift.

Waters Collection.—A large collection of European Tertiary fossils. Acquired by gift, 1885.

Williamson Collection.—A large general collection of fossils, especially rich in specimens of the fauna and flora of the Yorkshire Oolites. Several examples of the latter are types figured and described by Lindley and Hutton in their "Fossil Flora of Great Britain." Acquired by gift, 1888.

In drawing up this catalogue I have received assistance, which I desire gratefully to acknowledge, from Professors Dawkins and Williamson, of the Owens College; Dr. H. Woodward and Mr. A. Smith Woodward, of the British Museum; Dr. R. H. Traquair, of the Edinburgh Museum of Science and Art; and Messrs. F. A. Bather, J. W. Davis, R. Kidston, E. T. Newton, and Mark Stirrup. I have also to thank the Palæontographical Society, the Geological Society, the Clarendon Press, and Messrs. Taylor and Francis for the use of illustrations.

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VEGETABILIA.

PTERIDOPHYTA.

Carpolithes conica, Lindley and Hutton, 1837.

1837. *Carpolithes conica*, Lindley and Hutton, Foss. Flora, pl. clxxxix., figs. 1, 2, and 4.

TYPE.—A trigonal conical fruit, bearing a circle of tubercles round the base.

Malton, Yorkshire.
Coralline Oolite. *Coll. Williamson.*

Carpolithes Bucklandi, Lindley and Hutton, 1837.

1837. *Carpolithes Bucklandi*, Lindley and Hutton, Foss. Flora, pl. clxxxix, figs. 3 and 5.

TYPE.—A trigonal conical fruit, more swollen than *C. conica*, and with a smaller base, but differing chiefly by the presence of tubercles over the whole surface.

Malton, Yorkshire.
Coralline Oolite. *Coll. Williamson.*

Lepidophyllum majus, Brongniart, 1828.

1828. *Lepidophyllum majus*, Brongn., Prod. Hist. Végét. Foss., p. 87.
1887. *Palmacites*, Stirrup, Trans. Manch. Geol. Soc., xix., p. 233, pl. ii., fig. 1.

The impression of a terminal cluster of leaves upon a block of Black Shale; the opposite half (obverse) is in the possession of W. Stewart, M.D., Bank House, Bacup.

Old Meadows Colliery, Bacup, Lancs.
Lower Coal Measures. *Donor, J. Lord.*

Lepidodendron, sp., Williamson, 1883.

1883. *Lepidodendron*, Williamson, Phil. Trans., pl. xxxiv.

Dichotomous branch of a Lepidodendron, terminating in smaller Halonial branches. Figured plaster cast; original in the Leeds Museum.

Locality (?)
Middle Coal Measures. *Coll. Williamson.*

Halonia regularis, Binney, 1872.

1872. *Halonia regularis*, Binney, Plants Carb. Strata, Palæont. Soc., pt. 3, p. 94, pl. xviii., fig. 38.

Professor Williamson informs me that he is giving further details regarding this specimen in a Memoir now in the press.

Peel Delph, Bolton-le-Moors, Lancs.
Millstone Grit. *Donor, Mr. Higson.*

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Calamites Suckowii, Brongniart, 1828.

1828. *Calamites Suckowii*, Brongniart, Prodr. Hist. Végét. Foss., p. 37.
1886. „ „ G. Wild, "An Interesting Discovery of Calamites," Trans. Manch. Geol. Soc., xviii., p. 447, wood-cuts A, B, and D.
1871. „ „ Phil. Trans. Roy. Soc., London, p. 497, pl. xxvii., fig. 34.

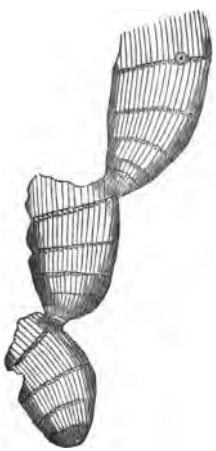

Fig. A. *Calamites Suckowii*, showing mode of origin of rhizomes. Bardsley Colliery.

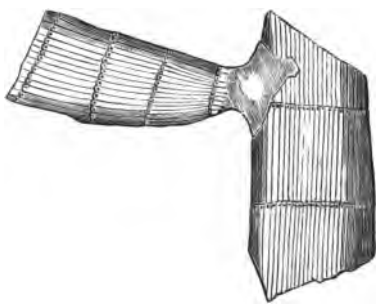

Fig. B. *Calamites Suckowii*. Bardsley Colliery, Ashton-under-Lyne.

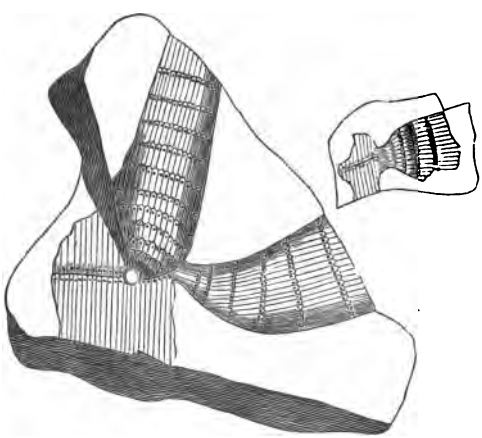

Fig. D. *Calamites Suckowii*, giving off two rhizomes. Limehurst Colliery.

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ORIGINALS OF WILD'S FIGURES.—Basal portions of stem, showing mode of origin of roots.

Lancashire.

Coal Measures. *Donor, G. Wild.*

ORIGINAL OF WILLIAMSON'S FIGURE.—Portion of stem, with areola from which rhizome originated.

Locality (?)

Coal Measures.

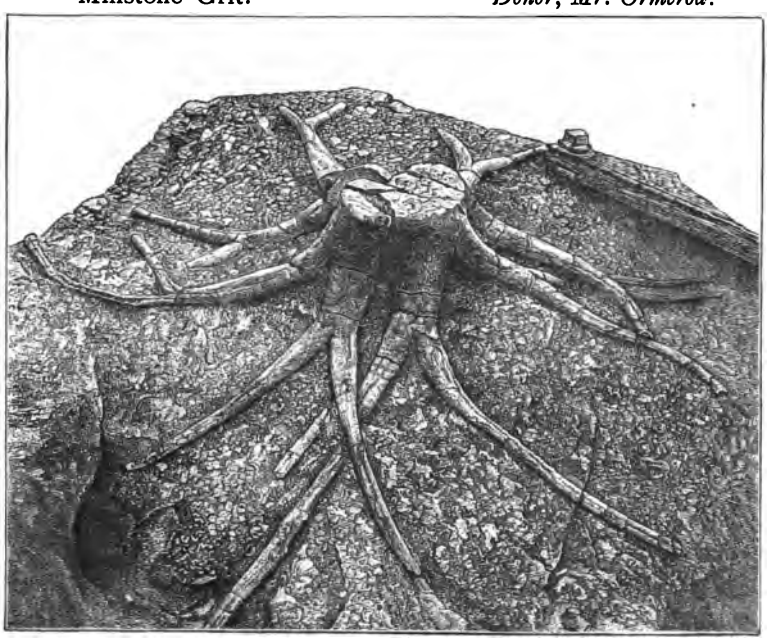
Stigmaria ficoides, Brongniart, 1822.

1822. *Stigmaria ficoides*, Brongniart, Class. de Végét. Fossiles, p. 9.
1848. „ „ Hooker, "On Some Peculiarities in the Structure of Stigmaria," Mem. Geol. Surv. ii., pt. 2, p. 431, pl. i., figs. 1 and 2.
1887. „ „ Williamson, Monogr. Stig. ficoides, Palæont. Soc., p. 45, pl. xv., fig. 80, cuts 7 and 8.

ORIGINAL OF HOOKER'S FIGURES.—Fragment of uncompressed Stigmarian root, showing a series of deep pits or cavities in which the roots originated.

Peel Quarry, Lancs.

Millstone Grit. *Donor, Mr. Ormerod.*



Specimen of *Stigmaria ficoides*, from the Lower Coal Measures, Clayton, near Bradford. Height of stump, 3 ft. 9 in.; diameter, 4ft. 4 in.; length of roots, 8 ft. 6 in. to 17 feet; diameter close to stump, 16 to 21 inches. (From a photograph.)

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ORIGINAL OF WILLIAMSON'S FIGURES.—A huge specimen of Stigmaria ficoides, showing the division into four primary roots at the base of the trunk, and the formation of secondary roots by a regular bifurcation. The specimen, as at present mounted, covers an area of 360 square feet. The trunk, having a diameter of 4 ft. 4 in., is preserved to a height of about four feet.

Clayton, Bradford, Yorkshire.

Millstone Grit.

Donors, Professor Williamson and Friends.

Stigmarian Trunks.

1841. *Stigmarian Trunks*, Bowman, "Foss. Trees found near Manchester," Trans. Manch. Geol. Soc., i., p. 115, pls. iii. and iv.

1887. „ „ Williamson, Monogr. Stig. ficoides, Palæont. Soc., p. 5, pl. i., figs. 1 and 2.

Two plaster casts of Stigmarian trunks found at Dixon Fold in making the railway from Manchester to Bolton, in 1837. It is a little doubtful whether Bowman's figures were taken from the plaster casts or from the original trunks. In figuring the plaster casts, Professor Williamson thus alludes to them:—"On examining the trees discovered at Dixon Fold it soon became obvious that the shaly materials of which they were composed would give way, however carefully they might be protected from the weather. Hence an Italian artist named Bally, well skilled in the art of making moulds, was employed to obtain exact casts of the two most important of the above trees." These casts are now in the Manchester Museum.

Dixon Fold.

Lower Coal Measures.

Rhabdocarpus multistriatus, Presl.

1887. *Rhabdocarpus multistriatus*, C. Dugdale, Trans. Manch. Geol. Soc., xix., p. 232, pl. i., fig 4.

A small ovoid fruit, marked on its exposed surface by longitudinal ribs.

Ravenshore, Haslingden, Lancs.

Millstone Grit Series. *Coll. Dugdale.*

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GYMNOSPERMÆ.

Cordaites borassifolius (Sternberg).

1820-23. *Flabellaria borassifolia*, Sternberg, vers. i., fasc. 2, pp. 27 and 32.
1887. *Cordaites* „ C. Dugdale, Trans. Manch. Geol. Soc., xix., p. 229, pl. i., fig. 2.

A large leaf, twelve inches in length.
Elton Bank Quarries, Edenfield, Lancs.
Millstone Grit Series. *Coll. Dugdale.*

ANIMALIA.

PROTOZOA.

Saccammina Carteri, Brady, 1871.

1849. *Nodosaria fusuliniformis* (?) McCoy, Ann. and Mag. Nat. Hist., (2) iii., p. 131.
1869. *Carteria sp.* Brady, Report Brit. Assoc., p. 372.
1871. *Saccammina Carteri* Id., Ann. and Mag. Nat. Hist., (4) viii., p. 177.
1876. „ „ Id., Monogr. Carb. and Perm. Foraminifera, Palæont. Soc., p. 57, pl. i. fig. 1.

Type.—A mass of dark-coloured limestone, with the upper surface considerably weathered, so that the Foraminifera present the appearance of small concretionary bodies. Presented by the late Dr. H. B. Brady to Professor Williamson, and by the latter to the Museum.

Elfhills, Northumberland.
Carboniferous Limestone. *Coll. Williamson.*

BRACHIOPODA.

Lingula cornea, Sowerby, 1839.

1839. *Lingula cornea*, Sow., in Murch., Sil. Syst., p. 603.
1852. „ „ McCoy, Brit. Pal. Foss., p. 251.
1865. „ „ Davidson, Monogr. Sil. Brach., Palæont. Soc., p. 46, pl. ii., fig. 35.

Type.—One of eight specimens upon which Davidson based his description of the species, Sowerby's type being regarded as a varietal form. The only specimen figured showing the interior.

Norton, near Ludlow, Shropshire.
Transition Beds. *Coll. Lightbody.*

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Lingula Lewisii, Sowerby, 1839.

1839. *Lingula Lewisii*, Sow., in Murch., Sil. Syst., pl. vi., fig. 9.
1852. „ „ McCoy, Brit. Pal. Foss., p. 253.
1859. „ „ Sow., in Siluria, pl. xx., fig. 5.
1865. „ „ Davidson, Monogr. Sil. Brach., Palæont. Soc., p. 35, pl. iii., fig. 2.

TYPE.—One of six specimens figured by Davidson as types of the species.

Whitcliff, Ludlow, Shropshire.

Upper Ludlow. *Coll. Lightbody.*

Discina rugata (Sowerby), 1839.

1839. *Orbicula rugata*, Sow., in Murch., Sil. Syst., pl. v., fig. 11.
1852. *Discina* „ McCoy, Brit. Pal. Foss., p. 190.
1859. „ „ Salter, in Murch., Siluria, pl. xx., figs. 1, 2.
1865. „ „ Davidson, Monogr. Sil. Brach., Palæont. Soc., p. 63, pl. v., figs. 9 to 18.

TYPE.—Original of Figure 11 in Davidson's Monograph. The original of figure 12 has not been traced.

Whitcliff, Ludlow, Shropshire.

Upper Ludlow. *Coll. Lightbody.*

Discina striata (Sowerby), 1839.

1839. *Orbicula striata*, Sow., in Murch Sil. Syst., tab. v., fig. 21.
1859. „ „ Id., in Murch., Siluria, pl. xx., fig. 3.
1862. *Discina* „ McCoy, Brit. Pal. Foss., p. 191.
1865. „ „ Davidson, Monogr. Sil. Brach., Palæont. Soc., p. 67, pl. vi., fig. 4.

TYPE.—The original of Figure 4 in Davidson's Monograph should be in the Lightbody Collection, but has not yet been found.

ECHINODERMATA.

Apiocrinus elegans (Defrance), 1819.

1819. *Astropodium elegans*, Defrance, Dict. des sciences naturelles.
1820. *Eucrinites Parkinsoni*, Schlotheim, Petrefaktenkunde.
1821. *Apiocrinites rotundatus*, Miller, Nat. Hist. Crinoidea, p. 18.
1826. *Pear Encrinus*, Cumberland, Reliquiæ Conservatæ, p. 4, pl. i., ii.

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The nomenclature of the species here adopted has been suggested by Mr. F. A. Bather.

A series of specimens figured in Cumberland's work.

(A) Basal fragments of stem, p. 5, pl. i., figs. 2, 3, 8, and 9.

(B) Basal fragments of stem (?) pl. ii., fig. 10.

(C) Heads, p. 4, pl. i., figs. 6 and 7.

(D) Section of stem, p. 6, pl. ii., fig. 11.

Bradford, Wiltshire.

Bradford Clay. *Coll. Cumberland.*

Dendrocrinus (?) Cambrensis, Hicks, 1873.

1873. *Dendrocrinus* (?) *Cambrensis*, Hicks, Quart. Journ. Geol. Soc., xxix., p. 51, pl. iv., fig. 20.

TYPE.—The largest and most complete of four specimens upon which the species is founded. The remaining three are in the possession of the Woodwardian Museum, Cambridge.

Ramsey Island, S. Wales.

Tremadoc Slates. *Coll. Lightbody.*

Palasterina Ramseyensis, Hicks, 1873.

1873. *Palasterina Ramseyensis*, Hicks, Quart. Journ. Geol. Soc., xxix., p. 57, pl. iv., figs. 21 and 22.

TYPES.—Two of the three specimens upon which the species was founded. The third is in the Woodwardian Museum, Cambridge.

Ramsey Island, S. Wales.

Tremadoc Slates. *Coll. Lightbody.*

MOLLUSCA.

Anthracomya Phillipsii (Williamson), 1836.

1836. *Unio Phillipsii*,	Williamson, Phil Mag., p. 351.
1839. ,, *linguiformis*,	Phillips, in Murch., Sil. Syst., p. 88.
1855 *Modiola sp.*,	Binney, Mem. Lit. and Phil. Soc., Manch., p. 221.

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1865. *Anthracomya Phillipsii*, Huxley and Etheridge, Cat. Foss. Mus. Pract. Geol., pp. 157 and 160.
1870. „ „ Jones, Geol. Mag., p. 217.
1877. „ „ Etheridge, jun, Geol. Mag. (2), iv., p. 243, pl. 12, figs. 6 and 7.

TYPES.—Two somewhat crushed specimens, the originals of Etheridge's figures.

Ardwick, Manchester.

Upper Coal Measures. *Coll. Williamson.*

Avicula (?) **Kirkmanni** (Brown), 1841.

1841. *Catillus Kirkmanni*, Brown, Trans. Manch. Geol. Soc., i., p. 225, pl. vii., fig. 66.

TYPE.—An oblong-ovate shell, a quarter of an inch in length; marked by well-defined concentric lines of growth. Umbones narrow and prominent. Upon a small slab of shale, 12 mm. square.

High Green Wood, Todmorden, Yorks.

Yoredale Shales, Carboniferous. *Coll. Gibson.*

Avicula (?) **lævis** (Brown), 1841.

1841. *Catillus lævis*, Brown, Trans. Manch. Geol. Soc., i., p. 226. pl. vii., fig. 67.
1849. „ „ Id., Foss Conch., p. 167, pl. lxvii., fig. 22.

TYPE.—An oblong-ovate shell, 18 mm. in length by 12 mm. in breadth. Strongly convex; surface marked by concentric lines of growth. Upon the surface of a slab of ironstone shale, one-and-a-quarter inches in length.

High Green Wood, Todmorden, Yorks.

Yoredale Shales, Carboniferous. *Coll. Gibson.*

Gervillia (?) **minor**, Brown, 1841.

1841 *Gervillia minor*, Brown, Trans. Manch. Geol. Soc., i., p. 227, pl. vii., fig. 70.
1849. „ „ Id., Foss. Conch., p. 165, pl. xl.**, fig. 31.

TYPE.—An ovate left valve, narrow in the region of the umbo, and marked by strong concentric folds; hinge-line long.

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Three specimens are in the Gibson Collection, none of which agree very closely with the figure. The largest specimen is probably the one from which Brown drew his figure. Length, 10 mm.; breadth, 12 mm.

High Green Wood, Todmorden, Yorks.
Yoredale Shales, Carboniferous. *Coll. Gibson.*

Ctenodonta Cambrensis, Hicks, 1873.

1873. *Ctenodonta Cambrensis*, Hicks, Quart. Journ. Geol. Soc., xxix, p. 47, pl. v., figs. 8 and 9.
1873. „ *elongata*, Id., In Salter, Cat. Camb. and Sil. Foss., p 24.

Type.—Internal cast, the original of Fig. 9.
Ramsey Island, S. Wales.
Tremadoc Slates. *Coll. Homfray.*

Modiolopsis Cambrensis, Hicks, 1873.

1873. *Modiolopsis Cambrensis*, Hicks, Quart. Journ. Geol. Soc., xxix., p. 49, pl. v., fig. 14.

Type.—Shell over 25 mm. in length by about 12 mm. wide. Ovate; inflated along hinge-margin. Anterior border obtusely rounded; posterior border pointed. Surface covered by concentric lines of growth.

Ramsey Island, S. Wales.
Tremadoc Slates. *Coll. Lightbody.*

Trigonia spinosa, Parkinson, 1811.

1811. *Trigonia spinosa*, Parkinson, Organic Remains, iii., pl. xii., fig. 7.
1815. „ „ Sowerby, Min. Conch., p. 196.
1854. „ „ Morris, Cat. Brit. Foss., p. 229.
1875. „ „ Lycett, Monogr. Foss. Trigonia, Palæont. Soc., p. 136, pl. xxiv., fig. 9.

Type.—Original of Lycett's figure. One valve only.
Blackdown, Isle of Wight.
Greensand. *Coll. Williamson.*

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Davidia plana, Hicks, 1873.

1873. *Davidia plana*, Hicks, Quart. Journ. Geol. Soc., xxix., p. 49, pl. v., fig. 13.

TYPE.—Ovate, nearly 25 mm. long, and rather less than 12 mm. wide, both extremities abruptly rounded. Beak pointed, and slightly incurved.

Ramsey Island, S. Wales.

Tremadoc Slates. *Coll. Lightbody.*

Euomphalus Gloveri (Brown), 1841.

1841. *Cirrus Gloveri*, Brown, Trans. Manch. Geol. Soc., i., p. 223, pl. vii., figs 46, 47.

TYPE.—Three internal casts of this species are all that can be found. Shell a very short spiral of three whorls, which increase very rapidly, and terminate in a round aperture.

High Green Wood, Hebden Bridge, Yorks.

Yoredale Shales. (?) *Coll. Gibson.*

Macrocheilus Flemingii (Brown), 1841.

1841. *Buccinum Flemingii*, Brown, Trans. Manch. Geol. Soc., i., p. 222, pl. vii., fig. 52.

1849. „ „ Id., Foss. Conch., p. 251, pl. xxi.*, fig. 52.

TYPE.—Shell oblong-ovate, smooth; spire short, of three whorls, the last much swollen. Length, 10 mm.; breadth, 5 mm.

High Green Wood, Todmorden, Yorks.

Yoredale Shales. (?) *Coll. Gibson.*

Macrocheilus Manni (Brown), 1841.

1841. *Buccinum Manni*, Brown, Trans. Manch. Geol. Soc., i., p. 221, pl. vii, figs. 53, 54.

1849. „ „ Id., Foss. Conch., p. 251, pl. xxi.*, figs. 53, 54.

TYPE.—Shell with four gradually tapering whorls, terminating in an acute apex. Length, 3 mm.

High Green Wood, Todmorden, Yorks.

Yoredale Shales. (?) *Coll. Gibson.*

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Goniatites intermedius, Brown, 1841.

1841. *Goniatites intermedius*, Brown, Trans. Manch Geol. Soc., i., p. 213, pl. vii., figs 6, 7, 8.
1849. „ „ Id., Foss. Conch., p. 246, pl. xxix.*, figs. 6, 7.

Two specimens only bearing this name have been found. They agree generally with Brown's description and Figures 6 and 7, but are rather smaller than the latter.

Lambert Clough, Todmorden, Yorks.
Carboniferous. *Coll. Gibson.*

Goniatites jugosus, Brown, 1841.

1841. *Goniatites jugosus*, Brown, Trans. Manch. Geol. Soc, i., p. 215, pl. vii., figs. 14, 15.
1849. „ „ Id., Foss. Conch., p. 247, pl. xxi.*, figs. 14, 15.

TYPE.—Shell discoidal, crossed by numerous strong ribs, which bifurcate or trifurcate in crossing the very broad ventral surface; ventral surface bearing a deep smooth groove; umbilicus broad and shallow. Much like *G. Gibsoni*, but differs in the smooth dorsal groove and the character of the septa. Breadth of largest specimen, 7 mm.

Hebden Bridge, Yorks.
Yoredale Shales. *Coll. Gibson.*

Goniatites Kenyoni, Brown, 1841.

1841. *Goniatites Kenyoni*, Brown, Trans. Manch. Geol. Soc., i., p. 216, pl. vii., figs. 19, 20.
1849. „ „ Id., Foss. Conch., p. 247, pl. xxi.*, figs. 19, 20.

Six specimens bearing this name are in the Gibson Collection, but none are so large as Brown's figure.

Hebden Bridge, Yorks.
Yoredale Shales. *Coll. Gibson.*

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Goniatites Longthorni, Brown, 1841.

1841. *Goniatites Longthorni*, Brown, Trans. Manch. Geol. Soc., i., p. 216, pl. vii, figs. 23-26.

1849. „ „ Id, Foss. Conch, p. 247, pl. xxi.*, figs. 23-26.

The specimens in the Gibson Collection bearing this name are much unlike Brown's figures; his description, however, applies fairly well.

Shell discoidal, crossed by a great number of fine striæ, which curve sharply forward on the sides, as in *G. bilinguis*, and curve backwards again over the ventral surface; umbilicus minute. One specimen must have had a diameter of 50 mm.

Hebden Bridge, Yorks.

Yoredale Shales. (?) *Coll. Gibson.*

Goniatites minutissimus, Brown, 1841.

1841. *Goniatites minutissimus*, Brown, Trans. Manch. Geol. Soc, i., p 218, pl. vii., figs. 29-31.

1849. „ „ Id, Foss. Conch., p. 248, pl. xxi.*, figs. 29-31.

TYPES.—An exceedingly minute Goniatite, possibly the young of some other species.

Shell sub-globose, mouth aperture semilunar, umbilicus wide. Breadth, 0·5 mm.

Millwood, Todmorden, Yorks.

Millstone Grit Shales. (?) *Coll. Gibson.*

Goniatites paradoxicus, Brown, 1841.

1841. *Goniatites paradoxicus*, Brown, Trans. Manch. Geol. Soc., i., p. 216, pl. vii., figs. 21, 22.

1849. „ „ Id., Foss. Conch., p. 247, pl. xxi.*, figs. 21, 22.

TYPE.—A single specimen, the outer shelly matter gone. Shell a little flattened laterally, with a minute umbilicus. Breadth, 3 mm.

High Green Wood, Yorks.

Yoredale Shales. *Coll. Gibson.*

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Goniatites undulatus, Brown, 1841.

1841. *Goniatites undulatus*, Brown, Trans. Manch. Geol. Soc., i., p. 213, pl. vii., figs. 1, 2, 3, 4, and 5.
1849. „ „ Id., Foss. Conch., p. 246, pl. xxix.*, figs. 1, 2, 3, 4, and 5.

TYPES.—Shell sub-globose, crossed by fine raised lines, which divide upon the side, curving backwards over the ventral border, which is very broad; umbilicus small.

Lambert's Clough, Todmorden, Yorks.
Yoredale Shales or Millstone Grit. *Coll. Gibson.*

Goniatites prœtus, Brown, 1841.

1841. *Goniatites prœtus*, Brown, Trans. Manch. Geol. Soc., i., p. 217, pl. vii., figs 27, 28.
1849. „ „ Id., Foss. Conch., p. 248, pl. xxi.*, figs. 27, 28

TYPES.—Six specimens, of which one appears to be the original of Brown's figure.

Shell discoidal, whorls many; mouth aperture high; umbilicus wide, and bordered by a fine raised ridge. Breadth, 10 mm.

Lob Mill, Todmorden, Yorks.
Shales of Millstone Grit Series. *Coll. Gibson.*

Goniatites subsulcatus, Brown, 1841.

1841. *Goniatites subsulcatus*, Brown, Trans. Manch. Geol. Soc., i.. p. 214, pl. vii., figs. 9. 10.
1849 „ „ Id., Foss. Conch., p. 247, pl. xxi *, figs. 8, 9, 10.

TYPES.—A series of fine specimens, one of which must have been the original of Brown's figure. Probably the specimens upon which this species is founded are adult forms of *G. jugosus*.

Hebden Bridge, Yorks.
Yoredale Shales. *Coll. Gibson.*

Digitized by Google

Goniatites Smithii, Brown, 1841.

1841. *Goniatites Smithii*, Brown, Trans. Manch. Geol. Soc., i., p. 218, pl. vii., figs. 34, 35.
1849. „ „ Id., Foss. Conch., p. 248, pl. xxi.*, figs. 34, 35

TYPE.—Shell globose, with strong transverse ribs; umbilicus wide. Breadth, 8 mm.

Millwood, Todmorden, Yorks.

Shales of Millstone Grit Series. (?) *Coll. Gibson.*

Orthoceras sericeum, Salter, 1866.

1866. *Orthoceras sericeum*, Salter, Mem Geol. Surv., iii., p. 356.
1873. „ „ Id., Camb. and Sil Foss., p. 18.
1873 „ *sp.* Hicks, Quart. Journ. Geol. Soc.. xxix., p. 51.
1882. „ *sericeum* Blake, Brit. Foss. Ceph., pt. 1, p. 138, pl. xiii., figs. 1, 2.

TYPE.—An almost complete specimen, the original of Blake's Fig. 1.

Garth, Brecknockshire.

Upper Tremadoc Slates. *Coll. Homfray.*

Orthoceras dimidiatum, Sowerby, 1839.

1839. *Orthoceras dimidiatum*, Sow., in Murch., Sil. Syst., p. 620.
1852. „ „ McCoy, Brit. Pal. Foss., p. 314.
1873. „ „ Salter, Camb and Sil Foss., pp. 98, 173.
1882. „ „ Blake, Brit. Foss. Ceph., pt. 1, pl. vi., p. 103, figs 11 and 12.

TYPE.—A specimen showing downward imbrications, the original of Blake's Figure 12.

Kington, Herefordshire.

Lower Ludlow. *Coll. Lightbody.*

Orthoceras perversum, Blake, 1882.

1839 *Orthoceras imbricatum*, (?) Sowerby, in Murch., Sil. Syst., p. 620.
1852. „ „ McCoy, Brit. Pal. Foss., p. 315.
1873. „ „ Salter, Camb. and Sil. Foss., p. 187.
1882. „ *perversum* Blake, Brit Foss. Ceph., pt. 1, p. 155, pl. xvi., figs. 1, 2.

TYPE.—A fine specimen, 22 cm. in length, the original of Blake's Figure 1.

Ludlow, Shropshire.

Upper Ludlow.

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Orthoceras acicularis, Brown, 1841.

1841. *Orthoceras acicularis*, Brown, Trans. Manch. Geol. Soc., i., p. 220, pl. vii., fig. 39.
1849. „ „ Id., Foss. Conch., p. 249, pl. xxix*, fig. 29.

TYPE.—Shell long, and tapering very gradually to an acute apex. Marked by many equidistant transverse septa. The specimen has been flattened by pressure, and lies in a small slab of shale bearing a few Ostracodes.

Todmorden, Yorks.

Shales of Millstone Grit Series. *Coll. Gibson.*

Orthoceras Browni, Gibson, 1841.

1841. *Orthoceras Browni*, Brown, Trans. Manch. Geol. Soc., i., p. 220, pl. vii., fig. 40.
1849. „ „ Id., Foss., Conch, p. 249, pl. xxix.*, fig. 31.

TYPE.—Shell arcuated; bearing a series of longitudinal angular ribs, crossed by fine oblique striæ; septa oblique, becoming increasingly separated as they ascend.

Todmorden, Yorks.

Shales of Millstone Grit Series. *Coll. Gibson.*

Orthoceras Gibsoni (Brown), 1841.

1841. *Belemnites Gibsoni*, Brown, Trans. Manch. Geol. Soc., i., p. 220, pl. vii., fig. 41.
1849. „ „ Id., Foss Conch., p. 249, pl. xxix.*, fig. 28.

TYPE.—Shell tapering but slowly, ending bluntly; section circular.

Crimsworth Dean, Yorks.

Yoredale Shales. *Coll. Gibson.*

Orthoceras obtusa, Brown, 1841.

1841. *Orthoceras obtusa*, Brown, Trans. Manch. Geol. Soc., i., p. 219, pl. vii., fig. 36.
1849. „ „ Id., Foss. Conch., p. 249, pl. xxix *, fig. 30.

TYPE.—Very stout shell, ending in a rounded extremity; surface marked by fine parallel undulating striæ, which suddenly increase in strength, and become more widely separated at about half the length. Length, 50 mm.; breadth, 30 mm.

High Green Wood, Yorks.

Yoredale Shales or Millstone Grit Series. *Coll. Gibson.*

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Lituites ibex (Sowerby), 1839.

1838. *Lituites ibex*, Sow., in Murch., Sil Syst., p. 622.
1848. *Orthoceras perelegans*, Salter, Mem. Geol Survey, pt. 2, pl xiii., fig. 4 only.
1873. „ *tracheale*, Id., Camb. and Sil. Foss., p. 187.
1882. *Lituites ibex*, Blake, Brit. Foss. Ceph., pt. 1, pp. 95 and 228, pl. v., figs. 3, 3*a*, 4, 5, 8; pl. xviii., figs 3, 4, 4*a*, 5.

TYPE.—Middle portion only, about 11 mm. in length. Original of Figs. 4 and 4*a* on pl. xviii.

Ludlow, Shropshire.
Upper Ludlow. *Coll. Lightbody.*

Trochoceras giganteum (Sowerby), 1839.

1839. *Lituites giganteus*, Sowerby, in Murch., Sil. Syst., p. 622.
1855. *Hortolus* „ McCoy, Brit Pal. Foss., p. 324.
1873. *Trochoceras* „ Salter, Camb. and Sil. Foss, pp. 160, 174.
1882. „ „ Blake, Brit. Foss. Ceph., pt. 1, p. 223, pl. xxxi., figs. 1, 2.

TYPE.—Specimen figured by Blake to show the asymmetry and contracted mouth aperture.

Leintwardine, Shropshire.
Lower Ludlow. *Coll. Lightbody.*

CRUSTACEA.

Leaia Leidyi, var. Williamsoniana, Rupert Jones, 1862.

1836. *Bivalvular shell* Williamson, Phil. Mag., N. S., ix., p. 351.
1839. *Aptychus* Phillips, in Murch., Sil. Syst., i., p. 89.
1862. *Leaia Leidyi, var. Williamsoniana*, Rupert Jones, Append. Monogr. Foss. Estheriæ, Palæont. Soc., p. 117, pl. i., figs. 19, 20.

TYPE.—Two conjoined valves.

Ardwick, Manchester.
Upper Coal Measures. *Coll. Williamson.*

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Carbonia Roederiana, Jones and Kirby, 1891.

1891. *Carbonia Roederiana*, Jones and Kirby, Trans. Manch. Geol. Soc., xxi., p. 138, pl. i., figs. 5 and 6.

TYPES.—Forms closely allied to *G. Rankiniana*, but having less relative length, and greater angularity of the dorsal and extreme borders.

Slade Lane, Longsight, Lancs.
Upper Coal Measures. *Coll. Roeder.*

Carbonia fabulina, Jones and Kirby, 1879.

1879. *Carbonia fabulina*, Jones and Kirby, Ann. and Mag. Nat. Hist. (5), iv., p. 31.
1891. ,, ,, Id., Trans. Manch. Geol. Soc., xxi., p. 139, pl. i., figs. 7 and 8.

Originals of the above-mentioned figures.

Slade Lane, Longsight, Lancs.
Upper Coal Measures. *Coll. Roeder.*

Carbonia Bairdoides, Jones and Kirby, 1879.

1879. *Cythere ? (Carbonia ?) Bairdoides*, Jones and Kirby, Ann. and Mag. Nat. Hist. (5), iv., p. 38.
1891. *Carbonia* Jones and Kirby, Trans. Manch. Geol. Soc., xxi., p. 139, pl. i., figs. 9 and 10.

Originals of the above-mentioned figures.

Slade Lane, Longsight, Lancs.
Upper Coal Measures. *Coll. Roeder.*

Carbonia Salteriana, Jones and Kirby, 1879.

1879. *Candona* (?) *Salteriana*, Jones and Kirby, Monogr. Foss. Estheriæ, Palæont. Soc., p. 122.
1891. *Carbonia* Id., Trans. Manch. Geol. Soc., xxi., p. 139, pl. i., figs. 11 and 12.

Originals of above-mentioned figures.
Slade Lane, Longsight, Lancs.
Upper Coal Measures. *Coll. Roeder.*

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Carbonia pungens, Jones and Kirby, 1879.

1879. *Carbonia pungens*, Jones and Kirby, Ann. and Mag. Nat. Hist. (5), iv. p. 37.

1891. „ „ Id., Trans. Manch. Geol. Soc., xxi., p. 138, pl. i., figs. 1 and 2.

Originals of the above-mentioned figures. First recorded occurrence in English deposits.

Slade Lane, Longsight, Lancs.

Upper Coal Measures. *Coll. Roeder.*

Carbonia secans, Jones and Kirby, 1879.

1879. *Carbonia secans*, Jones and Kirby, Ann. and Mag Nat. Hist. (5), iv., p. 37.

1891. „ „ Id., Trans. Manch. Geol. Soc., xxi., p. 138, pl. i., figs. 3 and 4.

Originals of the above-mentioned figures.

Slade Lane, Longsight, Lancs.

Upper Coal Measures. *Coll. Roeder.*

Ceratiocaris minuta, Jones and Woodward, 1886.

1885. *Ceratiocaris sp. nov.*, (?) Third Report Pal. Phyll., p. 350, Geol. Mag., p. 464.

1886. „ *minuta*, Fourth Report Pal. Phyll., p. 231, Geol. Mag., p. 458.

1888. „ „ Jones and Woodw., Brit. Pal. Phyll., Palæont. Soc., p. 47, pl. x., fig. 11.

Type.—Caudal appendage only.

Old road at Mocktree, Shropshire.

Lower Ludlow, or Aymestry Limestone.

Coll. Lightbody.

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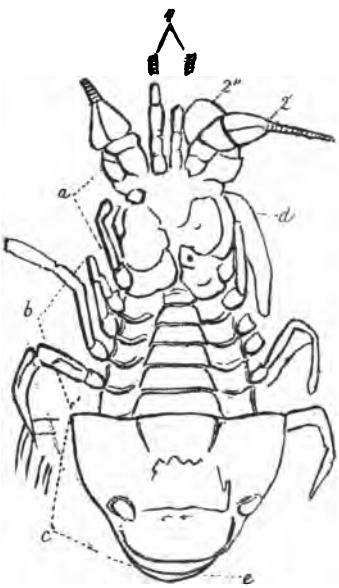
Pygocephalus Cooperi, Huxley, 1857.

1857. *Pygocephalus Cooperi*, Huxley, Quart. Journ. Geol. Soc., xiii., p. 363, pl. xii., figs. 1, 1*a*, 1*b*.

1862. „ „ Id., Quart Journ. Geol. Soc., xviii, p. 421.



Pygocephalus Cooperi, Huxley, magnified 1½ diameter. *a*, Quadrate disk; *b*, Central part of the body; *c*, Semicircular disk; *d*, Marginal portions of Carapace; *e*, Tergal surface of abdominal somites; 1′, Antennules; 2′, Base and inner division of antenna; 2″, Outer division of antenna or scale.

Type.—The most complete of three specimens upon which Huxley founded the species. Huxley speaks of this species as affording "the first certain evidence of the existence of Podophthalmia at so early a period as the Carboniferous epoch."

Medlock Park Bridge, Ashton-under-Lyne, Lancs.

Shale of Middle Coal Measures.

Hymenocaris vermicauda, Salter, 1852.

1852. *Hymenocaris vermicauda*, Salter, Rep. Brit. Assoc., p. 58.

— „ „ Id., Quart. Journ. Geol. Soc., x., p. 210.

— „ „ Id., Mem. Geol. Surv. iii., p. 293.

1892. „ „ Jones and Woodw., Brit. Pal. Phyll., Palæont. Soc., p. 77, pl. xiii., figs. 10 and 11.

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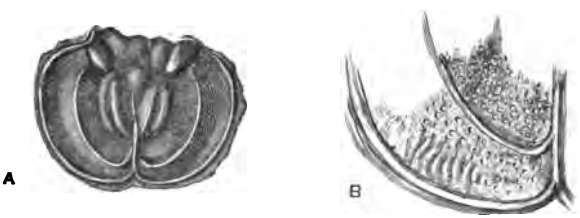
Two specimens showing body segments only, figured by Dr. Woodward.

Carrig-Felyn.

Lingula Flags. *Coll. Homfray.*

Cyclus Scotti, sp. nov.*



A Dorsal aspect of carapace; natural size.

B Left postero-lateral margin, magnified to show ornamentation.

TYPE.—Shield, or carapace, nearly circular in outline, bilaterally symmetrical (25 mm. broad by 20 mm. long), having a well-marked median ridge dividing the carapace in half for 8 mm. from the posterior border; posterior margin slightly indented or notched in the centre; the lateral and posterior margins of the shield encircled by a smooth raised rim, which stops short at the antero-lateral margin (which is slightly compressed where the rim terminates), the shield being truncated for a breadth of 12 mm. in front. There is evidence on the right side of a slight extension of the smooth margin of the shield outside the raised rim; anteriorly the shield is ornamented by four nearly equal oval prominences, each being about 5 mm. long, placed two on either side of the central line, ‡with their longer axis directed towards the front of the shield; a well-marked, smooth, semicircular ridge occupies the centre of each lateral area, and unites with the raised median ridge near the posterior border of the shield. The area enclosed between the outer and median ridges becomes

* The description and notes are from the pen of Dr. H. Woodward, F.R.S.

‡ The two inner oval prominences have been *largely cut away* in an injudicious attempt to develop the anterior part of carapace.

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considerably narrower as these approach the centre, near the posterior region of the carapace. The median ridge ends in front, close to the outer pair of oval prominences; two other rather semicircular smooth raised ridges, broader and shorter than the preceding ridge (by which, indeed, they are encircled), occupy the inner and more central portion of the shield, the outer one commencing near to the inner one on the central ridge, at 5mm. distance from the posterior border, and curving forwards until they touch the posterior ends of the two pairs of oval prominences near the front of the carapace. In the centre, between these raised ridges and the oval bodies, is a small lozenge-shaped area, which is continued backwards till it unites with the median ridge of the shield. The surface of the shield (particularly the posterior portion) is very finely granulated with minute circular and oval pustules (see wood-cut, Fig. **B**). No eye-spots are observable (unless a pair of the oval prominences in front may represent eyes). There is no trace of any appendages to be discerned on the matrix.

Observations.—Of the seven species of *Cyclus* described by me from this country, six are from the Carboniferous Limestone of Yorkshire and Ireland (see Geol. Mag., 1870, vol. vii., pp. 554-558, pl. 23), and one from the Coal-Shales of Carluke, Scotland (see Brit. Assoc. Reports, 1868, p. 72, pl. ii., fig. 1, and op. cit.) Several specimens, not yet described, were obtained, many years since, from the Pennystone Ironstone, over the thick coal of the Staffordshire Coal-field, at Coseley, near Dudley, by the late Mr. Henry Johnson, C.E., F.G.S., of Dudley, and an account of them will be shortly published.

In general outline this species from Bacup resembles most nearly *Cyclus (Halicyne?) agnotus*, H. von Meyer, sp., from the Muschelkalk of Rottweil, Germany (see Palæontographica, 1847, i., p. 234, pl. xix., fig. 23), but it differs in having an indentation or notch in the posterior border, whereas the German specimen has a small prominence. The

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arrangement of the ornamentation of the shield is also very distinct. I have, therefore, no hesitation in treating it as a new species, and have named it *Cyclus Scotti*, after its discoverer, Mr. George Scott, by whom it was presented, some time ago, to the Manchester Museum, Owens College.

Old Meadows Colliery, Bacup, Lancs.

Gannister Coal Shales, Lower Coal Measures.

Donor, G. Scott.

TRILOBITA.

Arionellus longicephalus, Hicks, 1872.

1872. *Arionellus longicephalus*, Hicks, Quart. Journ. Geol. Soc., xxviii., p. 176, pl. v., figs. 24-26.

TYPES.—Three out of seven specimens upon which Dr. Hicks founded the species.

The originals of Figures 24 and 25 are minus the head.

Maentwrog, N. Wales.

Menevian. *Coll. Homfray.*

Niobe Menapiensis, Hicks, 1873.

1873. *Niobe Menapiensis*, Hicks, Quart. Journ. Geol. Soc., xxix, p. 46, pl. iv., figs. 5-9.

TYPES.—Five out of nine incomplete specimens upon which Dr. Hicks founded the species. The original of Figure 5 is a glabella; that of Figure 6 a whole body, but wanting the head; the remaining three are pygidia.

Ramsey Island, and St. David's, S. Wales.

Tremadoc Slates. *Coll. Homfray.*

Niobe Homfrayi, Salter, 1864.

1864. *Niobe Homfrayi*, Salter, Monogr. Camb. and Sil. Tril., Palæont. Soc., p. 164, pl. xx., fig. 3.

1866. „ „ Id., Append. Ramsay's Geol. N. Wales, Mem. Geol. Surv., iii., p. 314.

TYPE.—The original of Figure 3 in Salter's Monograph; an almost complete specimen, wanting only the free cheeks.

Penmorfa Church, Tremadoc, N. Wales.

Lower Tremadoc Slates. *Coll. Homfray.*

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Neseuretus Ramseyensis, Hicks, 1873.

1873. *Neseuretus Ramseyensis*, Hicks, Quart. Journ. Geol. Soc., xxix.. p. 44, pl. iii., figs. 7-10, and 16-22.

TYPE.—A fragmentary pygidium, the original of Figure 20. The originals of Figures 8, 9, 15, 16, 18, 19, and 22 are in the Woodwardian Museum, Cambridge.

Ramsey Island, S. Wales.

Lower Tremadoc Slates. *Coll. Homfray.*

Neseuretus quadratus, Hicks, 1873.

1873. *Neseuretus quadratus*, Hicks, Quart. Journ. Geol. Soc., xxix., p. 45, pl. iii., figs. 11-13, and 23, 26.

TYPE.—A distorted pygidium, the original of Figure 6. The remaining specimens, upon which Dr. Hicks founded the species, are in the Woodwardian Museum, Cambridge.

Ramsey Island, S. Wales.

Lower Tremadoc Slates. *Coll. Homfray.*

Neseuretus sp., Hicks, 1873.

1873. *Neseuretus, sp.*, Hicks, Quart. Journ. Geol Soc., xxix., pl iii., fig. 14.

A left free cheek only.

St. David's, S. Wales.

Lower Tremadoc Slates. *Coll. Homfray.*

Neseuretus, sp., Hicks, 1873.

1873. *Neseuretus, sp.*, Hicks, Quart. Journ. Geol. Soc , xxix., Expl. to pl. iii., fig. 20.

A somewhat fragmentary pygidium.

Ramsey Island, S. Wales.

Lower Tremadoc Slates. *Coll. Homfray.*

Phillipsia gemmulifera (Phillips), 1836.

1836. *Asaphus gemmulifera*, Phillips, Geol. Yorkshire, p. 240.
1843. *Phillipsia Kelli*, Portl., Rep. Geol. Londonderry, p. 307.
1844. „ *quadriserialis*, McCoy, Syn. Carb. Foss. Ireland, p. 162.
1883-4. „ *gemmulifera*, Woodw., Monogr. Brit. Carb. Tril., Palæont. Soc., pp. 17 and 45, pl. iii., figs. 1-8.
1888. „ *pustulata*, Etheridge, Cat. Brit. Pal. Foss., p. 242.

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TYPE.—An entire thorax and pygidium, but wanting the head, the original of Woodward's Fig. 3 on pl. iii. From the collection of J. Aitken, Esq., of Urmston, presented by Professor Williamson.

Clitheroe, Lancs.

Carboniferous Limestone. *Coll. Aitken.*

Griffithides acanthiceps, H. Woodward, 1883-4.

1833-4. *Griffithides acanthiceps*, H. Woodward, Monogr. Brit. Carb. Tril., Palæont. Soc., p. 32, pl. vi., figs. 2, 10, and 11; pl. vii., figs. 2 and 3.

TYPE.—An almost complete specimen, wanting only the right free cheek and anterior border of the glabella. The original of fig. 2 on pl. vii. From the collection of J. Aitken, Esq., of Urmston, presented by Professor Williamson.

Craco, Grassington, Yorks.

Carboniferous Limestone. *Coll. Aitken.*

MEROSTOMATA.

Eurypterus punctatus, Salter, 1859.

1859. *Eurypterus punctatus*, Salter, Mem. Geol. Surv. Brit., Org. Rem., Monogr. 1, p. 99, pl. xiii., fig. 11.

1872. „ „ Woodw., Brit. Foss. Merost., Palæont. Soc., p. 156.

TYPE.—A large endognathary palpus, bearing two spinous processes.

Whitcliff, Ludlow, Shropshire.

Upper Ludlow. *Coll. Lightbody.*

Pterygotus Ludensis, Salter, 1859.

1859. *Pterygotus Ludensis*, Salter, Mem. Geol. Surv. Brit., Org. Rem., Monogr. i., p. 79, pl. xiv., figs. 7, 8.

1872. „ „ Woodw., Brit. Foss. Merost., Palæont. Soc., p. 76, pl. xvi., fig. 9, woodcut 15.

TYPE.—The originals of the above-mentioned figures.

(A) Basal joint of an ectognath, with short serrations (Fig. 8).

Railway Cutting, Ludlow, Shropshire.

Upper Ludlow or Transition Beds.

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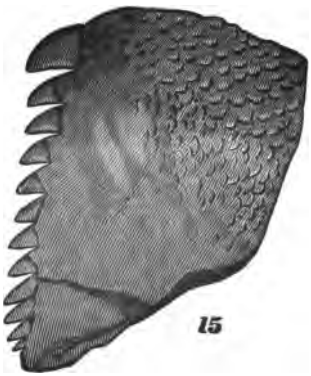
(B) An endognath, the original of Fig. 7.
Ludlow, Shropshire.
Upper Ludlow or Transition Beds. *Coll. Lightbody.*



Mandibular border of ectognath of Pterygotus Ludensis, Salter (Natural size).

(C) Part of the serrated border of a large ectognath (Woodward's woodcut 15).
Railway Cutting, Ludlow, Shropshire.
Upper Ludlow or Transition Beds. *Coll. Lightbody.*

Pterygotus Banksii, Salter, 1856.

1856. *Himanopterus Banksii*, Salter, Quart. Journ. Geol. Soc., xii., pp. 32 and 99.
1859. *Pterygotus* „ Id., Mem. Geol. Surv. Brit., Org. Rem., Monogr. i., pp. 51, 59, pl. xii., figs. 22, 40.
1872. „ „ Woodw., Brit. Foss. Merost., Palæont. Soc., p. 72, pl. xvi., fig. 2.

TYPE.—(A) Complete carapace, original of Salter's Figure 22.
Ludlow, Shropshire.
Transition Beds. *Coll. Lightbody.*

(B) Impression of fragment of antennary chela. Obverse of original of above-mentioned Figure 40 of Salter.
Ludford Lane, Ludlow, Shropshire.
Upper Ludlow, or Transition Beds. *Coll. Lightbody.*

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Stylonurus megalops, Salter, 1859.

1859. *Eurypterus megalops*, Salter, Quart., Journ. Geol. Soc., xv., p. 233, pl. x., fig. 10.

1872. *Stylonurus* ,, Woodw., Brit. Foss. Merost., Palæont. Soc., p. 124.

TYPE.—One of six specimens upon which the species is founded. It consists of a little more than half of the anterior portion of a carapace.

The whole of the type-specimens of this species are probably in the Lightbody Collection, but cannot at present be traced.

Railway Cutting, Ludlow, Shropshire.

Transition Beds. *Coll. Lightbody.*

PISCES.

Cyathaspis Banksii (Huxley and Salter), 1856.

1856. *Pteraspis Banksii*, Huxley and Salter, Quart. Journ. Geol. Soc., xii., p. 100.

1867. *Cyathaspis* ,, Lankester and Powrie, Monogr. Old Red Sandstone Fishes, Palæont. Soc., p. 26, pl. iv., fig. 6.

TYPE.—A well-preserved head-shield.

Bradnor Hill, Herefordshire.

Transition Beds. *Coll. Lightbody.*

Auchenaspis Salteri, Egerton, 1857.

1857. *Auchenaspis Salteri*, Egerton, Quart. Journ. Geol. Soc., xiii., p. 286, pl. ix., figs. 4 and 5.

TYPES.—Two small head-shields, 12 mm. in diameter, figured and described by Egerton.

Railway Cutting, Ludlow, Shropshire.

Upper Ludlow. *Coll. Lightbody.*

Plectrodus mirabilis (?), Agassiz, 1857.

1857. *Plectrodus mirabilis*, Agassiz, Quart. Journ. Geol. Soc., xiii., p. 288, pl. x., figs. 3*a*, 3*b*.

Small fragment, and impression of jaw.

Paper Mill, Ludlow, Shropshire.

Transition Beds. *Coll. Lightbody.*

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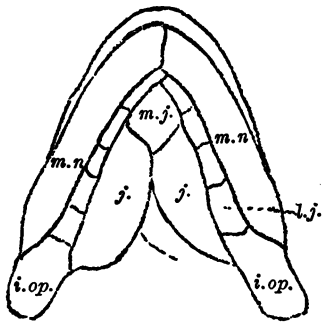
Diplopterus Agassizii, Traill, 1841.

1841. *Diplopterus Agassizii*, Traill, Trans. Roy. Soc. Edin., xv., p. 89.
1892. „ „ Traquair, Ann. and Mag. Nat. Hist. (6) vi., p. 484, fig 3.



Under surface of the head of *Diplopterus Agassizii*, reduced one-third. *m.n*, mandible; *i.op.*, interoperculum; *j.*, principal jugal; *m.j.*, median jugal; *l.j.*, lateral jugal plates.

Impression of the fish lying on its back. The lateral jugals are particularly well marked; there are five on the right side, four on the left.

Achanarras, Caithness.

Old Red Sandstone. *Coll. Edwards.*

Pleuracanthus lævissimus, Agassiz, 1837.

1837. *Pleuracanthus lævissimus*. Ag., Poiss. Foss., iii., p. 66.
1892. *Pleuracanthus lævissimus*, Davis, Trans. Roy. Dublin Soc., iv., p. 730, pl. lxx., fig. 8.

Figured specimen of a Gill-raker. A small bony ossicle, bearing a series of fine-pointed denticles.

Locality (?)

Middle Coal Measures.

Pleuracanthus undulatus, J. W. Davis, 1892.

1892. *Pleuracanthus undulatus*, Davis, Trans. Roy. Dublin Soc., N.S., iv., p. 737, pl. lxxii., fig. 16.

TYPE.—Spine 12·3 cm. in length, bearing upon its upper posterior surface two rows of denticles widely separated and diagonally arranged, those of one row being slightly in advance of those of the other; readily distinguished by the larger and widely separated posterior denticulation.

Fulledge Colliery, Burnley, Lancs.

Thin-bed Coal. *Donor, G. Wild.*

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Onchus, sp., Egerton.

1857. *Onchus, sp.* Egerton, Quart. Journ. Geol. Soc., xiii., p. 288, pl. x., figs. *7a*, *7b*.

1888. *Tail spine of Pterygotus* (*?*) Etheridge Cat. Brit. Pal. Foss., p. 128.

A strongly curved longitudinally ribbed spine, armed with denticles along its posterior border.

Railway Cutting, Ludlow, Shropshire.
Transition Beds. *Coll. Lightbody.*

Myriolepis Hibernica, sp. nov.*

TYPE.—Of the fossil fish now to be described I know only two specimens, of which one is in the Manchester Museum, Owens College, the other in the Museum of Practical Geology, Jermyn Street, London. Both are from the Coal Measures, Jarrow Colliery, Co. Kilkenny, Ireland.

The Manchester specimen is imperfect, being broken off about half an inch behind the anal fin; the dorsal fin is also deficient, but its position is indicated by the subjacent fin-supports. The pectoral, ventral, and anal fins are present.

The measurements are as follows:—

Entire length of the specimen, so far as preserved ...	7½ in.	(18·75 cm.)
From tip of snout to origin of pectoral fin	2 „	(5 cm.)
„ „ „ „ ventral „	4 „	(10 cm.)
„ beginning of pectoral to beginning of ventral fin	2¼ „	(5·7 cm.)
„ „ ventral „ „ anal „	1⅞ „	(4·8 cm.)
Depth of body at origin of ventral fin	3 „	(7·5 cm.)
Length of head to posterior margin of gill cover	2¼ „	(10 cm.)

The head shows scarcely any detail, though it is at once apparent that its structure was typically Palæoniscoid, with anteriorly placed orbit, oblique suspensorium, and wide gape. Its length is contained 3½ times in the total up to the tail pedicle, where the specimen is broken off.

* The following description and notes are from the pen of Dr. Traquair, F R.S.

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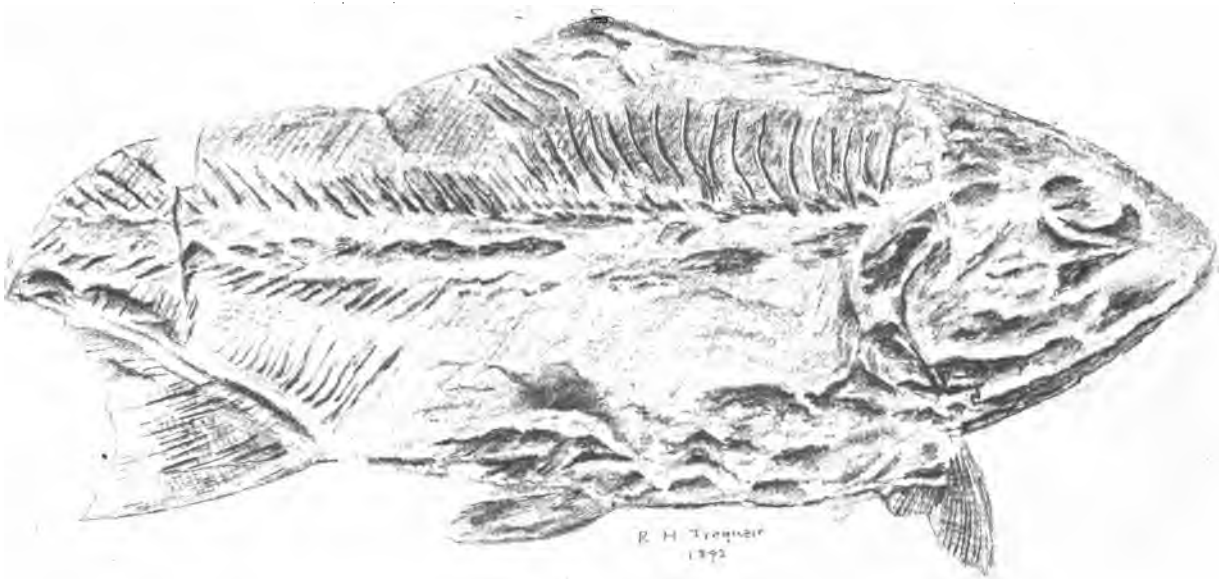

MYRIOLEPIS HIBERNICA.—TRAQUAIR.

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The rather deeply fusiform body is shown to have been covered with rhombic scales, which were exceedingly small in proportion to the size of the fish, those in the front of the flank measuring only $\frac{1}{20}$ in. in height and breadth; only feeble traces of a striated ornament are observable on them. Some large median scales are seen in front of the dorsal fin.

The scales must also have been very thin, as they have allowed the contour of the bones of the internal skeleton to be tolerably distinctly indicated through them, these indications being in the form of impressions of vertebral arches and spines, and of interspinous bones or fin-supports. The skeleton as thus exhibited is typically Palæoniscoid.

The fins which are preserved are of moderate size, even small for the size of the fish. The pectoral is not completely shown, though enough is preserved to show that it consisted of numerous fine closely set rays, which were also closely articulated, the principal rays being also jointed up to their origins. The ventral fin is small and narrow, with fine rays of a character similar to those of the pectoral. The anal is triangular-acuminate, its hinder margin somewhat concavely excavated, and consists likewise of numerous fine closely set rays, whose transverse articulations are extremely close. The dorsal fin is not preserved, but, judging from the position of its supporting ossicles, it must have occupied a position nearly opposite the interval between the ventral and anal.

The specimen in the museum at Jermyn Street, London, represents a somewhat larger fish, the length from the front of the head to the posterior termination of the base of the anal fin being $8\frac{1}{2}$ in. (about 20 cm.), and here it is broken off, nearly at the very place where the same has happened to the one at Owens College. However, the dorsal fin is preserved, and shows a contour and structure similar to those of the anal in both examples.

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There can be no doubt that this fish is new to science as a species; the only question remaining for consideration is that of the genus to which it should be referred. The Carboniferous genera to which it seems most closely allied are *Elonichthys* and *Acrolepis;* but it is excluded from both by the very small size and thinness of the scales, and more especially from *Acrolepis* by the rays of the pectoral fin being articulated to their origins.

So far as the smallness of the scales and the arrangement of the fins is concerned, there is a very considerable resemblance between the present fish and the early mesozoic genus *Myriolepis*, as described originally by the late Sir Philip Egerton,* and more recently by Mr. A. Smith Woodward.† But the condition, as to articulation, of the rays of the pectoral fin of *Myriolepis* does not seem yet to be known, and should its principal rays turn out not to be articulated up to their origins, as in the present fish, there is little doubt that a new genus must be constituted for the reception of the latter.

Though it does strike one as slightly improbable that the same genus of Palæoniscidæ should persist from Carboniferous to Triassic times, I feel the setting up of new genera in this already most extensive family, without absolute demonstration of its necessity, becoming more and more distasteful. I therefore refer this interesting Irish Carboniferous Palæoniscid to the genus *Myriolepis*, under the name of *M. Hibernica;* though it must be distinctly understood that this reference is only provisional, and awaiting confirmation, or the reverse, by the further development of our knowledge of the type species of the genus.

* Quart. Journ. Geol. Soc., xx., 1864, p. 2.

† "The Fossil Fishes of the Hawkesbury Beds at Gosforth (New South Wales)," pp. 7-11.

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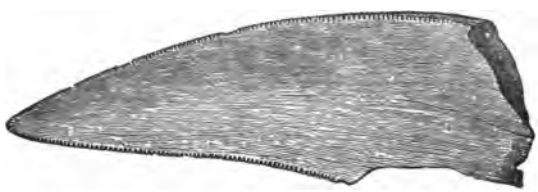
MAMMALIA.

Machærodus latidens, Owen.

1846. *Machærodus latidens*, Owen, Brit. Foss. Mamm., p. 179.
1872. „ „ Dawkins and Sandford, Brit. Pleist. Mamm., Palæont. Soc., pt. 4, p. 184.
1877. „ „ Dawkins, Quart. Journ. Geol. Soc. xxxiii., p. 594, fig. 3.
1880. „ „ Id., "Early Man in Britain," p. 186, fig. 58.



Upper Canine of *Machærodus*. Robin Hood Cave.

Crown of upper canine.
Robin Hood Cave, Derbyshire.
Pleistocene. *Coll. Dawkins.*

Elephas primigenius, Blumenbach, 1803.

1803. *Elephas primigenius*, Blumenbach, Handb. der Naturgeschichte, p. 407.
1833. „ „ S. Woodw., Syn. Tab. and Geol. Norfolk, p. 50.
1846. „ „ Owen, Brit. Foss. Mamm., p. 217.
1879. „ „ W. Boyd Dawkins; A. Leith Adams, Brit. Foss. Elephants, Palæont. Soc., pt. 2., p. 87-89, pl. viii., figs. 4-7.

A series of four First Functional Milk Molars, described and figured as above.

Right lower milk molar, from Church Hole Cave.
„ „ „ „ „ Wookey Hole Cave.
„ upper „ „ „ Robin Hood Cave.
„ „ „ „ „ Wookey Hole Cave.

Pleistocene. *Coll. Dawkins.*

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ON THE ARRANGEMENT OF ROCK COLLECTIONS IN MUSEUMS.

By H. M. Platnauer.

THE Petrologist has peculiar difficulties to deal with in drawing up a scheme for the classification of rocks.

To begin with, the scientific and systematic study of rocks is a matter of recent date. Hence the subject has not reached the stage of perfection that many other branches of Science have. The age of observation must precede that of generalization; and a long period of patient accumulation of facts has to be passed through before observers are in a position to theorize and classify. And a long time is needed for the fittest among contending theories to emerge as survivors.

But besides these difficulties, which time will doubtless remove, are others permanent and inherent in the subject. Of these I will refer to two salient ones:—

(1) The want of definite individuality about a rock specimen. Every such specimen is simply a lump broken off a large mass. It is a sample of that mass, or, it would be safer to say in most cases, of part of that mass. It has no individuality in the sense that an organism or a crystal has.

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(2) Rocks consist of mixtures of minerals, in proportions that are neither constant nor definite. Two rocks containing the same mineral ingredients may contain them in totally different proportions. At the same time these rocks may shade with each other by absolutely insensible gradations.

Hence we can scarcely expect a really satisfactory plan of classifying rocks; and we must expect to make profound, and even revolutionary, changes in our system as knowledge of the subject advances.

Unfortunately, the marks by which we classify rocks are of an inconspicuous kind. In saying "unfortunately," I am, of course, speaking from the point of view of a museum curator. That classification is best for a museum which rests on the most obvious and conspicuous points of difference or resemblance. It is almost impossible for the museum visitor to appreciate a classification founded on subtle differences; and every curator, in arranging his collections, feels this keenly. But the matter is beyond his control. He is bound to keep abreast with contemporary Science; and classification simply embodies the results of investigation and the state of knowledge at any given period.

The chief characters of rocks on which classification can be founded are:—

(1) Mineralogical Composition.
(2) Chemical Composition.
(3) Texture.
(4) Origin, as evidenced by occurrence in the field.

These I consider points of primary importance, and all others can, I think, be expressed in terms of one or more of the above. I will take one character which I have omitted in my list, and the omission of which may strike some of my hearers as strange—*Age*. Age unquestionably does affect rocks, but its effect always appears as a change in mineralogical composition, or texture, or both. It is true that the German Petrologists consider age as a factor of primary importance in the classification of Igneous Rocks.

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In this country their case is not generally considered as proved. I will not, however, enter into this question at length. Anyone wishing for a concise and able treatment of the question cannot do better than read the chapter on the classification of Igneous Rocks in "British Petrography," by J. J. Harris Teall, F.R.S.

My intention is to give, and briefly criticize, a few of the most important systems proposed, and finally to give that which seems to me, on the whole, the best. I have not attempted hitherto to discuss the question with any depth, nor shall I attempt to do so. Our aim, in this Association, is not exhaustive treatment, but practical guidance. My purpose is served if I can make it easier for a fellow curator who has not had time to study Petrology to arrange the rock specimens in his charge.

Rocks are sometimes divided into two great groups—(1) *Crystalline* (*i.e.*, characterized by a general prevalence of crystalline texture); and (2) *Clastic*, or composed of irregular or broken fragments. This classification is not without something to recommend it: it is simple, and easy of application. The Crystalline Rocks, as a whole, correspond to Erruptive or Igneous Rocks, and Clastic to Stratified Rocks. But it is open to serious objections. In the first place, it would compel us to class Rock Salt and Gypsum with Granite and Basalt, and a volcanic Tuff with a Sandstone or Clay. In the next place, it is too purely a Petrological system; it is founded on texture alone, and neglects the origin or history of the rock. It is surely better, if possible, to adopt a classification which shall be Geological as well as Petrological. To the Geologist the origin of a rock connotes its structure, but its structure does not necessarily connote its origin.

The plan adopted in Green's "Physical Geology," of dividing rocks into Crystalline, Non-Crystalline, and Intermediate (the latter group containing crystals of secondary origin), avoids some of the difficulties besetting the last

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system, but is open to most of the gravest of the objections urged against it.

For my part, I have a decided preference for the old division into Aqueous, Metamorphic, and Igneous, and shall proceed upon those lines in my future remarks.

With regard to Aqueous Rocks, there is, on the whole, a tolerable amount of agreement, and substantial agreement on the subject of Metamorphic Rocks, though the latter group can scarcely be said to have a scientific frontier. It is when we come to Igneous Rocks that we find the widest difference of opinion as to classification.

Aqueous Rocks.

These have, by some Petrologists, been divided into (i) Mechanically deposited rocks; (ii) Chemically deposited rocks; and (iii) Organically deposited rocks. Each of these classes had been again divided into (*a*) Siliceous, (*b*) Calcareous, and (*c*) Argillaceous or Aluminous members. My objections to this classification are:—(1) Three classes are very unequal in size, the chemically deposited class being obviously much smaller than the mechanically deposited one, and (2) it is in some respects confusing to the uninitiated. Thus, *e.g.*, Limestone would appear in all three classes.

I should prefer a simple division founded on the composition of the rocks. On this scheme, Aqueous Rocks would be divided into—

(i) *Argillaceous Group:* Clay, Fuller's Earth, Marls, Shales, and Slates.

(ii) *Arenaceous Group:* Sandstone, Sand-rock, Siliceous Sinter, "Pudding-stone," Grit, Arkose. The Calcareous Grits link this group to the next.

(iii) *Calcareous Group:* Limestone, Calc Sinter, Tufa, Dolomite.

(iv) *Carbonaceous Group:* Lignite, Jet, Coal, Anthracite.

I certainly beg two very disputed questions by separating Dolomite and Anthracite wholly from the Metamorphic Rocks. But strict accordance with theory would compel me

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to put some Dolomites with Aqueous Rocks and others with Metamorphic Rocks, to the great confusion of the ordinary observer. When once he has grasped some scheme of classification he will be in a position to appreciate the reason for the apparent cross division that occurs in more advanced schemes.

Metamorphic Rocks.

The main principle of classification in these rocks is the degree of alteration observable.

The following division is substantially that proposed by Professor Judd:—

I. *Slightly Altered Rocks.*—These are sub-divided into (*a*) Siliceous (Quartzites); (*b*) Aluminous (Lydian Stone); (*c*) Calcareous (Crystallized Limestones and Dolomites).

II. *Slaty Rocks.*—These are all Aluminous or Argillaceous only; they include Clay Slates, Mica Slates, and Chlorite Slates.

III. *Schistose Rocks.*—Again divided into (*a*) Siliceous (Quartz Schiefer); (*b*) Argillaceous (Mica Schists, Hornblende Schists); and (*c*) Calcareous (Calc Schiefer).

IV. *Gneissose Rocks.*—The Siliceous members are represented by Pegmatite and Greissen, the Argillaceous by Gneiss and Garnet-rock, the Calcareous by Crystalline and Serpentinized Limestones and Marbles.

I cannot see sufficient reason for separating the Slates, as a class, from the Aqueous Rocks; they seem to me less altered than the Quartzites and Porcelain Jaspers.

The classification adopted in Green's "Physical Geology" is as follows:—

I. Rocks which retain traces of bedding. This group corresponds to Group I. of the foregoing scheme, with the addition of the Clay Slates. It is sub-divided into (*a*) Siliceous, (*b*) Argillaceous, and (*c*) Calcareous members.

II. Foliated or Schistose Rock. This group includes Schists, Gneisses, and some Serpentines.

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III. Amorphous Metamorphic Rocks. These are indistinguishable from Plutonic Rocks in hand-specimens.

The introduction of Serpentines into Group II. seems to me a weak point in this scheme, regarded from an exhibition point of view. As most of the Serpentines would seem to be decomposed Peridotites, I should prefer putting them wholly among the Igneous Rocks.

Again, Group III. as a whole presents a standing difficulty to my mind. Not even a skilled observer could tell the Metamorphic Granites from the truly Plutonic Granites. Hence, to avoid the difficulty of having the same rock-species appearing in two different divisions, I should suggest referring all Group III. to the Igneous Rocks. And indeed, among the factors producing alteration in such cases, we may, I think, fairly include heat so intense (locally) as to entitle the rocks subjected to it to rank as Igneous.

The scheme I would advise is very nearly that given above, with Group III. excluded.

I. *Slightly Altered Rocks.*—(*a*) Argillaceous Members (Lydian Stone, Altered Clays, Porcellanite, Spotted Slates). The Jaspers link this group to the next. (*b*) Arenaceous Members (Quartzite, Quartzite Conglomerate). (*c*) Calcareous Members (Marbles). (*d*) Carbonaceous Members (Graphite).

II. *Foliated Rocks.*—(i) Schists; (ii) Gneisses.

It would be an advantage, where space permitted, to put the specimens of Class II. (slightly altered rocks) parallel with the corresponding unaltered members of the Aqueous Rocks.

Igneous Rocks.

With these rocks there is greater difficulty in selecting a method or principle of classification, as well as more difficulty in detailed sub-division, than in the preceding cases.

I should select the following types of classifications:—

1. The Mineralogical method, *e.g.*, Zirkel's scheme.

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2. The method depending on texture or structure. This is the plan adopted by Lassaulx.

3. Schemes like those of Rosenbusch, depending chiefly on origin, partly on structure.

4. What I should call the *Chemical* scheme.

Zirkel proposes classifying Igneous Rocks by their Felspathic constituents. This plan is less arbitrary than might at first sight appear, as the nature and bacisity of the Felspar in a rock depends to a great extent on the quantity of Silica contained in it.

On this system rocks would be classified thus:—

I. *Orthoclase Rocks.*—Granite, Syenites, Liparites, Quartz Porphyry, Orthoclase Porphyry, Pitchstone, Obsidian, Trachyte, Phonolite.

II. *Plagioclase Rocks.*—Diorite, Quartz Diorite, Porphyrite, Andesite, Basalt, Gabbro, Diabase.

III. *Nepheline Rocks, e.g.*, Nepheline Basalt.

IV. *Leucite Rocks, e.g.*, Leucitophyr.

V. *Non-Felspathic Rocks, e.g.*, Ecklogite, Eulysite, Saussurite Gabbro.

Very similar to this is the scheme adopted by Teall in his "British Petrography," his "Ferro-Magnesian" Group being practically Zirkel's "Non-Felspathic" Group. Teall, however, classes the Nepheline and Leucite Rocks as one group—a better arrangement, considering the sameness of character running through Zirkel's Groups III. and IV., and also the fact that many rocks contain both minerals. Indeed, Sodalite and Haüyne might be united with them, and a group constituted of rocks containing "Felspathoid" constituents. Teall also classes the Glassy Rocks as a distinct group, and makes another distinct group of rocks which will not conveniently fit into any of the other groups.

Lassaulx classifies Igneous Rocks according to the amount and nature of the matrix present. He would divide them thus:—

I. *Glassy Rocks.*—Obsidian, Tachylyte.

II. *Glassy Magma.*—Basalt, Augite-Andesite.

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III. *Micro-crystalline Base.*—(i) Non-Porphyritic—Felsite, Rhyolite. (ii) Porphyritic—Felsite Porphyry, Trachyte, &c.

IV. *Very Little Glassy or Micro-crystalline Base.*—Phonolite, Hornblende-Andesite.

V. *Crystalline Granular (no Magma).*—Granite, Diabase, Syenite, Diorite, Gabbro, Peridotite, Ecklogite, Garnet Rock.

I now give, in outline, Rosenbusch's scheme, as an example of a classification depending mainly on origin or occurrence in the field.

I. *Plutonic Masses (Crystallized).*—Granite, Syenite, Diorite, Diabase, Gabbro, Peridotite.

II. *Dyke or Vein-Stones.*—Greissen, Porphyritic Granites and Syenites, Minette.

III. *Lavas.*—(i) Old—Quartz Porphyry, Porphyrite, Melaphyr. (ii) New—Trachyte, Andesite, Phonolite, Basalt.

Finally, I would suggest the following scheme as at least convenient, if not the most scientifically accurate one obtainable. My scheme is an old one, and many may consider it out of date; but I claim this for it—that it is very convenient for museum purposes.

I. *Acid Rocks.*—(i) Crystallized (Granite). (ii) Glassy Base (Felsite, Quartz-Trachyte). (iii) Glassy (Obsidian).

II. *Intermediate.*—(i) Crystallized (Syenite, Diorite, Leucitophyr). (ii) Glassy Base (Trachyte, Phonolite, Andesite, Minette). (iii) Glassy (Pitchstone).

III. *Basic.*—(i) Crystallized (Gabbro, Diabase, Peridotite). (ii) Glassy Base (Dolerite, Basalt). (iii) Glassy (Tachylyte, Hyalomelane).

The placing of Diorite in the Intermediate Group may be objected to; doubtless it has strong affinities with Basic Rocks. On the other hand, however, it presents such strong analogies to Syenite, and is so often quartzose, that so long as there is an Intermediate Group, it seems to me the proper place for Diorite. The difficulty might be met by abolishing Group II., and transferring the Syenites and Trachytes to the Acid Rocks, and the Diorites and Andesites

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to the Basic Group. But such an arrangement might suggest to the tyro a sharpness of demarcation which does not exist, while the very name "Intermediate" Group would remind him of the fact, too often forgotten, that Nature rarely makes leaps. The position of the Leucite Rocks is also a point on which I might be criticized by a Petrologist. But my whole scheme is a purely tentative one, and I looked to having it modified—perhaps even destructively—by criticism and discussion.

Mr. CAMERON expressed a hope that Mr. Platnauer would print his paper and the tabulated schemes that he had read, the subject being one which few museum curators took up.

Mr. RUDLER agreed with the reader of the paper as to the great difficulty of the subject, and said that he feared that it was almost impossible to get an arrangement which was at once simple and scientific. Something must be sacrificed, either one way or the other.

[This paper was read at the Cambridge Meeting of 1891, but, owing to delay of the printers, it was omitted from the Report of that year.]

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REPORT OF THE COMMITTEE

APPOINTED TO CONSIDER THE

QUESTION OF SECURING THE HELP OF SPECIALISTS FOR MUSEUM CURATORS.

Up to the present there has been very little attempt made to make use of the scheme suggested in last year's Report. But it is yet far too soon to pronounce upon the success of the project, especially as the plan has probably not yet received the serious consideration of many of the members of the Association.

It would therefore, perhaps, be well to remind members of the scheme submitted by this Committee to the General Meeting at Cambridge last year, and adopted by that meeting. The scheme may thus be summarized:—Any Museum Curator desirous of having a collection named or arranged should communicate with the Secretary of the Committee, who would give him the name of some specialist or specialists able and willing to undertake the work, and would also state the price for the performance of the work.

H. M. PLATNAUER,
Secretary.

REPORT OF LABEL COMMITTEE.

In accordance with the recommendations made in the Report submitted to the Association last year, the Label Committee had prepared two descriptive labels, copies of

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which, together with the following circular, have been sent to all museums. It was thought best to issue these labels with the Report of last year's "Proceedings," so that museums should have before them at the same time both the labels and the Committee's Report. These two labels related to the Class Mammalia, and the Order Rodentia, each in a different type, and on differently coloured paper. Owing to the delay in the issue of the "Proceedings," the labels were not in the hands of Curators until within a few days of the present meeting, and there has been very little time for Curators to offer any opinions upon them. The idea of a series of descriptive labels appears to have met with general approval; and the number of museums that have already expressed their willingness to subscribe for these labels makes it desirable to publish them, and it is hoped that during the next twelve months it will be possible to do this.

E. HOWARTH,
Secretary.

[COPY OF CIRCULAR.]

MUSEUMS ASSOCIATION.

LABEL COMMITTEE.

In compliance with the recommendation made in the Label Committee's Report (published in the "Proceedings" for 1891), two descriptive Labels are here printed as examples, with a view to inviting expressions of opinion and criticisms from Museum Curators.

With regard to descriptive Labels it is proposed, in the first instance, to have a set for Zoological divisions only, to comprise a separate Label for each Sub-Kingdom, Class, and Order, and these would number altogether about 100. If the set were confined strictly to 100, it would probably be necessary to leave out some of the Orders, but all well-defined Orders would be given. The Labels printed belong to this set, and are given in two different types, one larger than the other, and Curators are requested to state which type they prefer. The price at which a Museum could obtain a set of these Labels would, of course, depend upon the number of Museums subscribing, and the greater the number of Subscribers the less would be the cost to each.

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If 30 Museums agreed to take a set of 100 Labels comprising all the Sub-Kingdoms, Classes, and most of the Orders of the Animal Kingdom, the cost to each would be about £2. If 40 Museums, the cost would be about 35s.; and if 50 Museums, it would be about 30s.

So that for 30s. a Museum belonging to the Association could obtain 100 descriptive Labels, embracing all the principal divisions of the Animal Kingdom, each Label prepared by a Specialist in the particular department to which it referred, and printed in legible type, to place with the specimens exhibited. The Secretary to the Committee (Mr. E. HOWARTH, Public Museum, Sheffield) will be pleased to hear from Museums proposing to subscribe for these Labels; and also to receive the opinions of Curators on the sample Labels printed, and on the scheme of labelling that has been proposed by the Committee.

Name-Labels of the Sub-Kingdoms, Classes, and Orders, without descriptive matter, will also be printed in large type, if Museums require them.

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The "Derby and Chesterfield Reporter," August 14th, 1891.

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